IMF WORKING PAPER

WP/92/74

INTERNATIONAL MONETARY FUND

Research Department

Wage Claims, Incomes Policy, and the Path of Output and Inflation in a Formerly Centrally Planned Economy

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September 1992

Abstract

The corporate governance problem of state enterprises in former socialist economies can give rise to excessive wage claims and/or capital decumulation. This paper focuses on these problems, highlighting the dynamic links between wage behavior, the fiscal deficit, inflation and the capital stock. Wage controls have been widely advocated as a response to the corporate governance problem. We show that in the presence of excessive wage claims a system of wage controls can help to limit capital decumulation and reduce inflation, since wage moderation implies higher government revenues from the profit tax and therefore lower money creation. More specifically, it is shown that when wage levels are initially excessive a reduction in the degree of wage indexation is effective in lowering inflation if nominal wages do not provide, on average, full protection against future inflation.

JEL Classification Number
E63, E64, P50

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I. Introduction

Different forms of wage controls have been introduced in most of Eastern Europe's stabilization plans: in Poland, Czechoslovakia and Yugoslavia they have been coupled with a (temporarily) fixed exchange rate, and in Bulgaria with a floating exchange rate. They are also widely regarded as an important element of the stabilization packages needed to confront the problems of Russia and the other republics of the former USSR. Because of the unprecedented nature of the stabilization task in formerly centrally planned (FCP) economies, a natural starting point for study is the evaluation of experience with the use of incomes policies in recent stabilizations in market economies. The so-called "heterodox" stabilization programs implemented in countries such as Israel, Mexico, Argentina and Brazil in the mid-eighties have been characterized by the adoption of incomes policies, together with a nominal exchange rate anchor, as means of reducing inflation while minimizing the associated output costs. In such programs, incomes policy was supposed to lower inflation expectations and help to overcome "coordination failures" in wage and price setting, thereby reducing the arbitrary income and wealth redistributions associated with a sudden change of the monetary and fiscal regime. The experience of these countries has stimulated an extensive literature on the role of wages and incomes policy as an "additional anchor" in stabilization programs. 1/ While there is no overall agreement on the effectiveness of heterodox plans, it seems uncontroversial that incomes policy is less effective and less credible if it is not accompanied by consistent monetary and fiscal policies aimed at reducing inflation, and if a similar plan has been unsuccessfully tried before. This points to the importance of paying careful attention to the design of an appropriate incomes policy and to its role in stabilization programs.

While the need to counteract inertial factors and "coordination failures" is also relevant to stabilization efforts in FCP economies, the main rationale for the role of wage controls in the latter is a different one. It is as a response to the "corporate governance problem" of state enterprises; namely, the possibility that state-owned firms' behavior will not be "in the best interest" of the owner (the State) but will instead reflect workers' and managers' efforts to redistribute resources to themselves to the detriment of government revenue from profits, as well as the level of investment. This may occur for several reasons. A pervasive problem of centrally planned economies has been that firms faced soft budget constraints, and were expected to continue their activity indefinitely. As the transition to a market economy takes place, however, the future of many firms becomes uncertain, because they confront the prospect of privatization or bankruptcy. These developments may shorten the horizon of workers and managers, inducing them to try to appropriate the firm's assets. For example, the capital stock can be run down by foregoing maintenance

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1/ See for example Dornbusch and Simonsen (1987), Kiguel and Liviatan (1989, 1992), Persson and van Wijnbergen (1989) and the papers in the volumes edited by Bruno et. al. (1988, 1991).

investment. 1/ Furthermore, if the imposition of hard budget constraints is not perceived as credible there is a potential for wage payments to escalate, since the firm expects to be bailed out if it experiences financial difficulties. In such an economic structure, an incomes policy may be essential in limiting the appropriation of the assets of state enterprises and limiting wage payments to "reasonable" levels until the problem of the proprietary structure is resolved. In sectors where there is a close link between wage and price inflation, and between wages and the fiscal deficit, this may supplement the traditional role of incomes policy as a means of reducing the output cost of an anti-inflation program.

While price controls were used alongside wage controls in most heterodox stabilization plans, the debate on the policy choices of FCP economies focuses almost exclusively on the latter, since imposing price controls would hamper adjustments in relative prices and imply a retrograde step towards the pre-reform situation. Furthermore, in FCP economies, continued imposition of price controls may be perceived as a lack of commitment to reform on the part of the government. Of course, wage controls also imply distortions which have to be weighed against the severity of the corporate governance problem.

Lane (1991a), among others, stresses three links between income distribution within state-owned enterprises in FCP economies and overall macroeconomic performance:

(1) A redistribution of firms' given revenues in favor of wages reduces the government's revenue from the profit tax, implying a larger recourse to money creation and therefore more inflation;

(2) Higher wages automatically feed into higher prices if firms respond to price liberalization by following automatic mark-up rules;

(3) Higher wages may come at the cost of reducing investment: in the presence of widespread uncertainty about future property rights and about the future of the firm in general, the capital stock can deteriorate because of a lack of investment in maintenance and capital upgrading. One should stress that the need for capital upgrading increases with the transformation of the economy to a market system, since this is likely to imply obsolescence of a significant portion of existing capital. A shift of resources from wage and tax payments to investment may thus be required.

1/ This point is made for example by Lipton and Sachs (1990), Hinds (1991), and Kiguel and Liviatan (1991). Lane (1992) among others stresses that wage controls were deemed necessary in Poland at the outset of the stabilization program of 1990 because of the lack of financial discipline and the degree of labor management in state enterprises. Bruno (1992) also stresses the importance of wage ceilings as support for an exchange rate anchor.

The model presented in this paper represents a simple formalization of points 1 and 3. It takes the existence of a corporate governance problem--reflected in "excessive" wage claims--as given, and analyzes its potential consequences for inflation, output, and the fiscal position. It also provides a simple framework for studying the role of wage controls in a stabilization program. These issues are analyzed in the context of a one-sector economy with a constant level of employment. 1/ The paper does not focus on such important issues as the optimal design of wage controls, their enforcement, and the distortions they introduce. Lane (1991a) provides a useful discussion of some of these issues.

Even though real wages have declined significantly in all reforming FCP economies in recent months, an analysis based on the assumption of initially excessive real wage claims is, we believe, warranted. 2/ In the former Soviet Union, for example, output and productivity declined considerably in 1991, but real wages rose well above their 1990 level. 3/ For countries of Central and Eastern Europe such as Poland it has been argued (Berg (1992)) that real wages had risen to unsustainable levels before the "Big Bang", and therefore a fall in real wages with respect to their 1989 levels was to be expected. Also, when studying the transformation process of a FCP economy, one needs to take into account the difficulty of comparing real wage levels pre-and post-reform, since the former were calculated by deflating the nominal wage using the official (and controlled) price index and therefore did not reflect actual purchasing power. Furthermore, the reduction or removal of subsidies on some consumer goods may cause consumer price inflation to exceed producer price inflation. Under these circumstances, the real product wage can rise despite the fact that the real

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1/ Consequently, the model ignores private production, the problems of resource re-allocation between sectors, and firms' employment decisions: see the related discussion in section II. Lane (1991b) presents a model of labor-managed state enterprises and analyzes the consequences for employment decisions of an incomes policy that takes the form of a ceiling on the total wage bill. However, he does not focus on the consequences of wage and employment decisions for government revenues and the path of capital.

2/ A stylized fact is the drastic fall in real wages immediately following the implementation of "Big Bang" programs in Poland and Czechoslovakia. A partial explanation for this fact is the large increase in effective taxation on firms caused by the initial price jump, since intermediate input purchases were evaluated at historical cost, as documented by Schaffer (1992a), and Berg and Blanchard (1992) for the case of Poland. This forced firms to "borrow" from workers by initially reducing wages below the incomes policy ceilings. Calvo and Coricelli (1992a, b) make a similar point, arguing that in Poland wages were initially reduced to improve the firms' cash flow position. This was necessary because of a liquidity squeeze, generated by tight credit.

3/ The average real wage--"consumption fund per worker in industry"--was very volatile in 1991: by November it was almost 50 percent above the January level according to some estimates.

consumption wage declines. 1/ Finally, the need for structural adjustment may imply that existing capital depreciates more rapidly. In fact, a fraction of the capital stock may become obsolete right away. In both these cases a larger fraction of enterprises' revenues may have to be directed to investment, at least for some time. In this context, a liquidity shortage generated by wage and tax claims incompatible with investment needs may slow the transition process and deepen the recession, even though real wages have fallen.

We turn now to the model. Suppose that the government announces a given fiscal and monetary stance, compatible with disinflation. In keeping with the "stylized facts" of a FCP economy, we assume that on the fiscal side the profit tax and the payroll tax are the main sources of government fiscal revenue, and their rates are given. For given tax rates, the distribution of firms' income between wages and profits matters because it affects the level of government revenue. Assuming that money creation is the only available means of financing the budget deficit, lower revenues may automatically generate higher money creation and higher inflation, undermining the credibility of the stabilization program. A tax reform that applied the same tax rate on wages as on profits would of course eliminate a direct link between the distribution of firms' revenues and the budget. As in other countries, however, it is likely to take a relatively long time to implement fundamental tax reform in FCP economies. Hence such reforms are an element of a medium- or longer-term solution. This paper, taking a more short-run perspective, treats the tax system as given. Tanzi (1991) provides an excellent introduction to the growing literature on tax reforms in former socialist economies. 2/

The rest of the paper is organized as follows. Section II presents the basic model. Section III defines the equilibrium in a competitive economy; compares it with the outcome in the case where real wages are pushed above the competitive level; and derives implications for the rate of inflation and the level of output. Section IV examines the implications of wage policy for output, inflation and the capital stock when capital depreciation is explicitly taken into account, and considers the impact of different forms of incomes policy on the behavior of the economy. Section V concludes.

1/ In Poland, for example, the former was constant in 1991, although output fell considerably; the latter rose instead by 12 percent (Estrin et. al. (1992)).

2/ See for example Tanzi (ed.) (1992). Lane and Dinopoulos (1991) construct a model of tax reform in a FCP economy, analyzing the impact of measures such as a broadening of the tax base and a shift in taxation from state enterprises to households.

II. The Model

The fiscal part of this model is a variant of that in Lin and Osband (1992) 1/ that fits several important "stylized facts" of a FCP economy. Suppose the government raises revenue out of the profit tax only; for simplicity, we assume that all profits are "taxed away". 2/ Depreciation allowances are considered costs and are therefore not taxed. The government raises revenue to finance two types of expenditure, government consumption and transfers, which are proportional to wages. Since no bond market exists, any shortfall in revenues is covered by printing money:

$$T_t = P_t y_t - W_t l_t \tag{1}$$

$$G_t = C_t^g + B_t = P_t c_t^g + b W_t l_t \tag{2}$$

$$\dot{M}_t^s = G_t - T_t \tag{3}$$

Capital letters indicate nominal variables, while lower case variables indicate real variables, unless otherwise stated. A dot over a variable indicates its time derivative. The variables are as follows:

y_t = real output (value-added) net of capital depreciation;

P_t = price of a unit of output;

W_t = nominal wage;

l_t = labor force;

1/ The main differences are the absence of government bonds (present in their model) and the inclusion of an explicit production function (absent in their model). The absence of bonds and the assumption about money holdings imply that workers do not save.

2/ This assumption is not particularly restrictive since the firms are owned by the government: profits can be taxed or simply remitted to the government. Lane (1992) discusses in more detail the impact of stabilization measures on the budget in FCP economies. Appendix III contains a discussion of the case in which the rate of the profit tax is less than unity. Note that a positive payroll tax θ_w can be introduced by simply replacing b with $(b-\theta_w)$ in the model.

T_t = nominal taxes;

G_t = nominal government spending;

C_t^g (c_t^g)= nominal (real) government consumption;

B_t = nominal government transfers (benefits);

M_t^s = nominal money supply.

This formulation of government expenditure (equation (2)) omits important sources of spending, such as subsidies to consumers and enterprises, and interest payments on foreign debt. Including these variables in a formal analysis would not alter the qualitative nature of the results. Using (1) and (2), the budget deficit can be expressed as follows:

$$G_t - T_t = (1+b) W_t l_t - P_t (y_t - c_t^g) \tag{4}$$

Equation (4) highlights two channels that link nominal wages to the government budget: higher wages reduce government revenue from the profit tax ($P_t y_t - W_t$) and increase transfers for social benefits to private individuals (bW_t). However, it should be noted that this second effect could be more than offset by a payroll tax at a rate higher than b.

Output is produced using capital and labor, with a Cobb-Douglas technology:

$$y_t = F(k_t, l_t, \pi_t) - \delta k_t = A(\pi_t) k_t^{\alpha} l_t^{1-\alpha} - \delta k_t, \quad A'(\pi_t) \leq 0 \tag{5}$$

where k_t is capital and π_t is the inflation rate. This functional form allows for a negative impact of inflation on total factor productivity, reflecting the disruptive effects of inflation on resource allocation. 1/

1/ It could be argued that it is the variability of inflation--rather than its level--that distorts relative price signals and resource allocation. The assumption in the text is then justified if the level and variability of inflation are positively correlated. Alternative formulations of the impact of inflation on output are also possible, and would not change the nature of the results.

We assume that the level of employment is constant, and normalize the size of the labor force to equal unity: 1/

$$l_t = \bar{l} = 1 \tag{6}$$

Casual empiricism suggests that layoffs in state-owned firms have been relatively limited in all FCP economies: in fact, output has fallen faster than employment as documented, for example, by Estrin et. al.(1992). 2/ Note that with constant employment the wage bill and the wage rate are the same, and k can be thought of as capital per worker.

Private agents are subject to a cash-in-advance (C-A) constraint:

$$aP_t c_t \leq M_t^d \tag{7}$$

where M_t^d is nominal money demand, c_t is real private consumption, and the parameter a measures the (constant) velocity of circulation of money. 3/ The constraint (7) states that private agents need money to settle a given fraction of their transactions. There are no financial assets that pay a positive nominal rate of return. Since the capital stock

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1/ Extending this model to the case of variable employment, in the context of a two-sector economy, is a task for future research. Lane (1991b) analyzes the employment decisions of a labor-managed firm in the presence of controls over the wage bill, obtaining results consistent with the actual path of employment in reforming socialist economies. Lane and Dinopoulos (1991) develop a two-sector model of a reforming socialist economy in which the wage and employment decisions in the "socialized" sector are the outcome of a bargaining process between the government and labor-managed state enterprises, and highlight the impact of different reforms on the government fiscal position.

2/ In Poland, reductions in employment in the state-owned industrial sector have been achieved mainly through attrition rather than by firing workers; see Schaffer (1992a) and Estrin et. al. (1992), Table A2.

3/ An interesting extension would be to allow the velocity of circulation to depend on the inflation rate; this could imply multiplicity of equilibria.

is owned by the State, it follows that the only asset private agents can hold is money. 1/ An individual worker's budget constraint is given by:

$$\dot{M}_t^d = (1+b)W_t - P_t c_t \tag{8}$$

The equation that determines the rate of accumulation of real capital per worker is equivalent to the resource constraint of the economy:

$$\dot{k}_t = y_t - c_t - c_t^g \tag{9}$$

In order to close the model, we need to specify a wage policy and consumers' behavior. From now on, we simply assume that consumers hold money balances only to satisfy the C-A constraint, but not to transfer resources across periods. In other words, the constraint (7) is always binding. 2/

III. Inflation and Real Wages

In order to highlight the potential impact of excessive wage claims associated with the corporate governance problem, it is useful to compare the behavior of wages in a FCP economy with the equilibrium that would obtain in the same model if workers and firms behaved competitively.

1. The competitive economy

Let $w_t = W_t/P_t$ be the real wage. In a competitive market economy the equilibrium real wage would adjust to be equal to the marginal product of labor. Using (4), this yields

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1/ Because money is the only privately held asset, it would be demanded even in the absence of a cash-in-advance constraint, and if the latter exists it may not hold with equality. For simplicity, we will abstract from the analysis of money savings other than for the purpose of satisfying the C-A constraint. A more complete treatment of seigniorage revenue can be found in Lane (1992). The assumption that workers do not hold inflation-proof assets is less realistic for countries like Poland, in which foreign currency deposits are large.

2/ Ideally, one would want to derive workers' behavior from utility maximization, considering decisions about the intertemporal profile of consumption. This task is complicated by the absence of a bond market and by the "irrationality" of excessive wage claims: a proper treatment would require explicit foundations for the workers' behavior.

$$w_t^{eq} = (1-\alpha) A k_t^{\alpha} \tag{10}$$

Assume initially that capital does not depreciate ($\delta_t = 0$). Using the above equation along with the normalization (6), one can express the budget deficit that would be consistent with a competitive equilibrium real wage as follows:

$$(G_t - T_t)^{eq} = P_t c_t^g - [1 - (1+b)(1-\alpha)] P_t y_t \tag{11}$$

Assume for example that government consumption is such that the budget (11) is in balance. This implies:

$$c_t^g = [1 - (1+b)(1-\alpha)] y_t \tag{12}$$

That is, government consumption is a fixed share of output. If (12) holds, money growth and inflation will be zero, and workers' consumption will be equal to real wages plus real benefits:

$$c_t^{eq} = (1+b) w_t = (1-\alpha)(1+b) y_t \tag{13}$$

2. Inflation and real wages when the labor share is too large

We now abandon the assumption that the real wage is equal to the marginal product of labor, and assume instead that workers are able to claim a larger share of output than the one that would prevail in a competitive market. This can be thought of as the outcome of the "corporate governance" problem in state enterprises in a FCP referred to in Section I above: some of these firms may be managed by workers, or management may be more "loyal" to workers than to the formal owner, the State. We will focus on two cases: in the first the real wage is assumed to be a fixed fraction of output, above its competitive level. In the second, wage indexation is assumed to be partial, with nominal wages reacting to the gap between the actual and

desired real wage. 1/ Before turning to wage behavior, we describe the production side of the economy and the dynamic budget constraints of individuals and government.

We have assumed that firms are bound to keep employment levels constant. In line with the previous section, we also assume that capital does not depreciate ($\delta_t = 0$); the production side is therefore fully described by the production function $y_t = A\, k_t^{\alpha}$.

The government's budget constraint is obtained by combining (3) and (4):

$$\frac{M_t^s}{P_t} = (1+b)w_t - (y_t - c_t^g) \tag{14}$$

Equation (14) highlights the endogeneity of monetary policy with respect to the real wage: for a given level of the production tax, revenue will be lower and money creation higher the higher is the real wage. As we show below, this will imply higher inflation; a higher opportunity cost of holding money; and lower output, assuming the latter depends negatively on inflation.

Since we assume that workers do not hold "excess" money balances, the C-A constraint is always binding. Differentiating the C-A constraint with respect to time, we can express the change in money holdings as a function of the inflation rate and the change in real consumption:

$$\frac{\dot{M}_t^d}{P_t} = a(\dot{c}_t + \pi_t c_t) \tag{15}$$

Substituting (15) into the private agents' budget constraint (8), we get:

$$\dot{c}_t = \frac{1}{a}\left[(1+b)w_t - c_t(1+a\pi_t)\right] \tag{16}$$

1/ This section has many points in common with Lin and Osband (1992).

where w_t is the real wage. Equation (16) shows that a positive rate of inflation increases the "effective price" of consumption. The reason is that individuals need to hold money balances to purchase consumption goods, and this implies an erosion of purchasing power when inflation is positive. The resource constraint of the economy requires:

$$c_t = y_t - c_t^g \tag{17}$$

For example, if public consumption is a constant fraction of output so will be private consumption, independently of the real wage level. 1/ We now turn to wage determination.

a. Fixed Real Wage

Suppose that the real wage is fixed at the level

$$w_t = (1-\beta) A k_t^{\alpha} \qquad \alpha > \beta \tag{18}$$

The rate of inflation corresponding to this given real wage will then be constant. It can be determined by setting (16) equal to zero and using (18):

$$\pi_t = \frac{c_t^g - [1-(1+b)(1-\beta)]y_t}{a(y_t - c_t^g)} \tag{19}$$

If public consumption is determined as in (12), for example, we get:

$$\pi_t = \bar{\pi} = \frac{\alpha - \beta}{a(1-\alpha)} \tag{19a}$$

1/ Note, however, that the level of output may depend on wage claims through the latter's impact on the inflation rate and on productivity, implying that the level of private consumption may depend on wages even when public consumption is a fixed fraction of output.

That is, inflation will be higher the larger the difference between the actual wage share and the competitive one. This result has an intuitive explanation: for a given share of government consumption in total output, the share of private consumption is determined residually, as shown for example in equation (17). If the real wage that workers demand is too high with respect to the residual share of output, inflation will reconcile the inconsistent income claims by reducing the real wage (unless it is fully indexed) and "taxing" the money balances that workers have to hold in order to purchase goods. In other words, inflation will increase the "effective price" of consumption goods, so that workers can purchase only the residual output share. Inflation will be lower the greater the demand for money generated by the C-A constraint (the higher is a). If productivity is negatively related to the inflation rate, as assumed in (5), the steady state levels of output and private consumption will be lower the higher the rate of inflation. Therefore in this model the attempt by workers to raise the real wage above the market clearing level is self defeating, and even leads to lower private consumption if productivity is inversely related to the inflation rate.

b. Partially Indexed Real Wage

An alternative assumption is that workers are not able to fix the real wage, but that the dynamics of the nominal wage depend: (1) on inflation, through an indexation parameter; and (2) on the gap between the actual and the desired real wage: 1/

$$\dot{w}_t = e\, n_t + \langle j \rangle\, (w - v_t) \qquad (20)$$

where o> is the (exogenously given) desired real wage. Assume for simplicity that the level of output is independent of the rate of inflation, and that real government consumption is constant over time. The analytical solution for the case in which inflation has a negative impact on overall productivity is sketched in Appendix I. With constant levels of real output and public consumption, real private consumption is constant as well. From (16) and (17) we can then determine the relation between the real wage and inflation in every period:

1/ A similar formulation is used by Lin and Osband (1992). They, assume that nominal wages are unindexed, but that they follow a. given trend.

$$\pi_t = \frac{1}{a}\left[\frac{(1+b)\,w_t}{y_t - c_t^g} - 1\right] \tag{21}$$

In the steady state the real wage and the rate of inflation are constant. From the wage equation (20), we can derive the locus of points in (π, ω) space along which the real wage is constant:

$$\pi_t \,|_{\dot{w}=0} = \frac{\phi}{1-\epsilon}\,(\omega - w_t) \tag{22}$$

Figure 1a depicts the loci $\pi\pi$ (equation 21) and ww (equation 22). By construction, the economy will always be on the locus $\pi\pi$. For a given inflation rate, when the real wage is above (below) the level determined by (22) it will be falling (rising) because of the nominal wage dynamics (20). The arrows on the locus $\pi\pi$ point to the dynamics of wages and inflation, and the intersection between the two lines determines their steady state levels. These are given by:

$$\pi^{SS} = \frac{\phi\,[(1+b)\omega - (y - c^g)]}{a\phi\,(y - c^g) + (1+b)(1-\epsilon)}$$

$$w^{SS} = \frac{(y - c^g)\,[a\phi\omega + (1-\epsilon)]}{a\phi\,(y - c^g) + (1+b)(1-\epsilon)} \tag{22a}$$

If wages do not respond to the gap between the actual and target real wage ($\phi = 0$), the steady state rate of inflation is zero and the real wage is $(y - c^g)/(1 + b)$; if the initial real wage is too high, inflation will gradually erode it until it reaches a level compatible with price stability. If ϕ is greater than zero, steady state inflation π^{SS} is positive if workers' real disposable income at the desired level of the real wage, $(1 + b)\,\omega$, exceeds output available for private consumption, $y - c^g$. The steady state real wage w^{SS} is higher the higher the target real wage: this however does not mean higher consumption, but simply a higher inflation tax on the money balances that workers have to hold. Note also that unless wages are fully indexed ($\epsilon = 1$), w^{SS} is always below ω. When indexation is full the steady state inflation rate does not depend on ϕ. It is higher the larger the gap between the target real wage ω (plus benefits $b\omega$) and the resources available for private consumption, $y - c^g$.

Using (14) and (22a) we can also calculate the steady state level of the real fiscal deficit, which is equal to the rate at which real money balances are created:

$$\left(\frac{G_t - T_t}{P_t}\right)^{SS} = a(y - cg)\,\frac{\phi[(1+b)\omega - (y - cg)]}{a\phi(y - cg) + (1+b)(1-\epsilon)} \qquad (22b)$$

The real fiscal deficit is larger the larger the indexation parameter and the larger the target real wage; it will be zero only if the latter ensures equality between workers' disposable income and resources available for private consumption. If public consumption is determined as a fixed fraction of output as in (12), so that the budget is in balance when the real wage is at its competitive level, the expressions in (22a) simplify to:

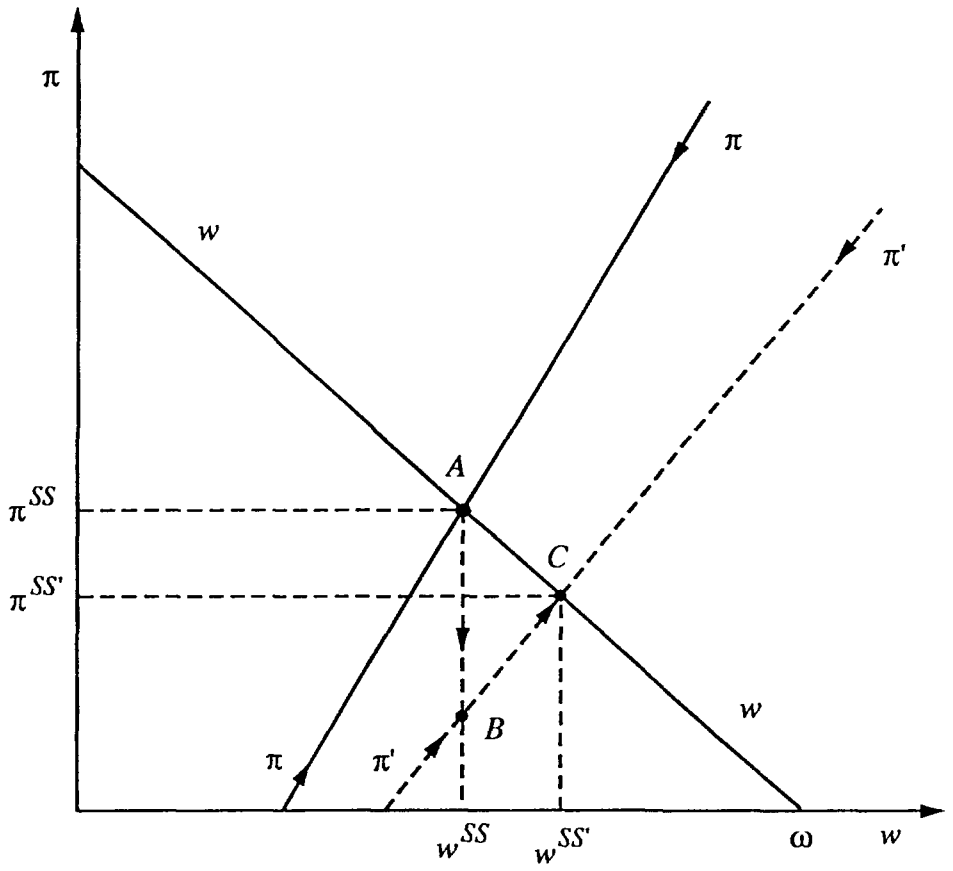
$$\pi^{SS} = \frac{\phi[\omega - (1-\alpha)y]}{a\phi(1-\alpha)y + (1-\epsilon)}$$
$$w^{SS} = \frac{(1-\alpha)y[a\phi\omega + (1-\epsilon)]}{a\phi(1-\alpha)y + (1-\epsilon)} \qquad (22c)$$

When the desired real wage is equal to its competitive level, $(1 - \alpha)\, y$, steady state inflation is zero and the actual and desired real wage coincide. The role played by wage-setting behavior in generating inflation in a FCP economy can be highlighted using Figure 1a. For example, a higher target real wage ω shifts the ww locus to the right and implies higher inflation and a higher real wage. A higher indexation parameter and a more rapid adjustment of nominal wages to the gap between actual and desired real wages make the ww locus steeper, and imply a higher real wage and higher inflation. We now characterize the impact of a wage push and of a stabilization plan in an economy that is initially in a steady state.

c. Wage Push

In this case inflation will rise by more the higher the indexation parameter, the larger the wage push, and the more reactive nominal wages are to gaps between the actual and target real wage. The explanation runs as follows. The initial wage push causes the real wage to rise. This means that inflation has to rise as well, in order to raise the effective price of consumption. The real wage will stop rising short of the target wage (unless indexation is full), at a level that is higher the larger is the indexation parameter. It follows that inflation has to be higher the larger is ϵ, in order to reduce workers' purchasing power through a higher inflation tax on money balances.

Figure 1a
Inflation and Equilibrium Real Wages:
Effects of a Reduction in b or c^g



3. Stabilization and the Role of Incomes Policy

Now suppose that, following the initial wage push, the government undertakes a stabilization program based on fiscal deficit reduction. Consider first the case in which output is fixed. We will consider both a reduction in government transfers and a reduction in government consumption. 1/

a. Reduction in transfers

In Figure 1a, a reduction in wage benefits shifts the $\pi\pi$ locus to the right and makes it flatter (locus π' π'). For a given initial real wage w^{SS} there is a decline in money creation and therefore an immediate fall in inflation; in the Figure, the economy moves from point A to point B. 2/ This causes the real wage to start rising, because the current wage is below the target real wage and the lower level of inflation fails to keep the real wage "in check". Inflation will rise as well and the economy will move along the π' π' locus, until it reaches a new steady state at point C. The new steady state real wage $w^{SS'}$ is higher than w^{SS} and the new steady state inflation $\pi^{SS'}$ is lower than π^{SS}.

Suppose now that the reduction in transfers is accompanied by an incomes policy, such as a reduction in the wage indexation parameter (Figure 1b). This makes the ww line flatter (w' w'). Inflation falls on impact by the same amount, as the economy moves from point A to point B; however, real wages and inflation now rise by less, until point D. The explanation runs as follows. The initial fall in inflation implies that real wages start to rise. Hence inflation needs to rise as well since private consumption cannot increase. The lower is the indexation parameter, the smaller is the increase in inflation that is necessary to keep the real wage "in check". As a result, the equilibrium levels of inflation and the real wage are lower at D than at C. Note that a lower real wage does not imply lower private consumption: since inflation is lower, the tax on money balances is lower and workers' purchasing power is unaffected. Therefore in this model an incomes policy accompanying a stabilization plan can help reduce inflation by more, for a given initial fiscal adjustment.

b. Reduction in government consumption

The $\pi\pi$ locus shifts to the right, analogously to the case of a reduction in wage benefits. Inflation falls on impact (as in the case above) but this time workers have additional purchasing power, since they receive the same real transfers from the government and the inflation tax has fallen. Private consumption therefore increases to its new level

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1/ A reduction in transfers is equivalent to an increase in the payroll tax: see Section II and Appendix III.

2/ This fall in inflation does not cause an increase in purchasing power, because transfers from the government have been reduced.

$y - c_g'$. The real wage and inflation will then rise until the new steady state is reached. In equilibrium, the real wage and inflation will be at the same levels as in the previous case. However, real transfers are higher (since b has not been reduced), which implies that workers have more money to spend and consume more. The consequences of a reduction in the indexation parameter on the real wage and inflation are the same as those outlined for case (i).

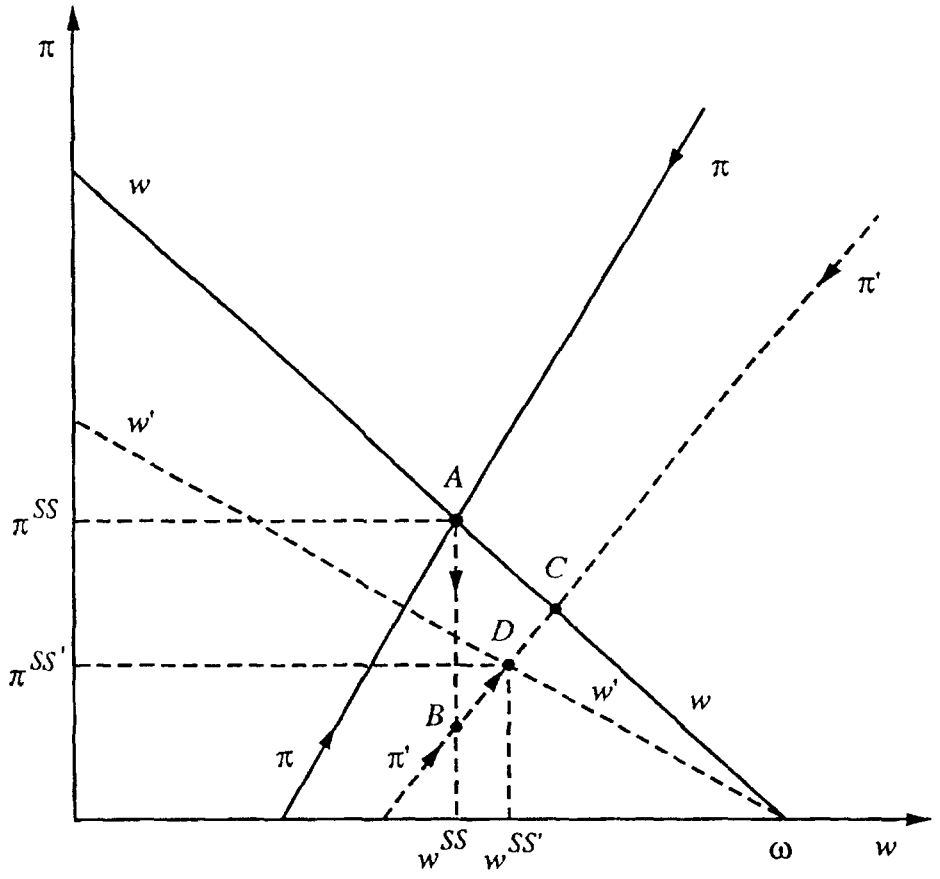
As stressed above, in this model inflation will be zero only if the target real wage is compatible with the level of government consumption. In this case, the loci $\pi\pi$ and *ww* intersect on the horizontal axis. For example, if government consumption is determined as in (12), inflation will be zero if the target wage equals the competitive wage, regardless of the indexation parameter. A high speed of adjustment of the real wage to its target level is a "good thing" if the target real wage is at the right level, but is inflationary otherwise.

A general result of this section is that starting from an inflationary equilibrium an incomes policy, such as a reduction in wage indexation, can by itself establish the conditions for a reduction in inflation, without any specific fiscal policy measure designed to reduce money creation. The reason is that inflation affects the real wage, and the real wage in turn affects the fiscal position of the government and hence money creation. If the indexation parameter is lowered, nominal wages rise less rapidly, and the rate of inflation that is necessary to bring the real wage to a sustainable level falls. In fact, a lower indexation parameter will lower the steady state real wage, but the tax burden on money balances will fall with inflation, leaving real private consumption constant. On the fiscal side, a lower indexation parameter implies a lower real budget deficit because it reduces the real wage. In other words, an incomes policy based on a reduction of the indexation parameter (or more generally of the real wage) allows the government to raise more revenue through the profit tax, reducing the need to raise revenue through the inflation tax. This result depends of course on the assumption that, even in a steady state, inflation can systematically affect real wages.

4. Variable Output

If the level of output depends on the inflation rate, the dynamics of the model are much more complex because private consumption is no longer constant. The characteristics of the dynamics and the steady state for this case are sketched in Appendix I. In general, a disinflationary program can achieve both a lower rate of inflation and a higher level of output. Suppose for example that the coefficient of wage indexation is lowered. From (22) this implies that the new steady state rate of inflation will be lower, and that output will be higher. The impact effect is a step reduction in the rate of inflation. However, because of the reduction in the indexation parameter, real wages will subsequently decline, along with inflation, until they reach their new steady state level. The path of productivity mirrors (by assumption) the path of inflation: there is an

Figure 1b
Inflation and Equilibrium Real Wages:
Effects of a Reduction in b or c^g Coupled with a Reduction in e



initial step increase followed by further increases until the new steady state level. For a given level of government consumption, setting the target real wage lower can therefore imply higher private consumption if inflation has a negative impact on overall productivity. This point is very important and has an initiative explanation. The real wage is not the appropriate measure of purchasing power: since individuals have to hold money to purchase consumption goods, the effective price of consumption goods is higher the higher the inflation rate. A higher real wage implies more money creation and inflation. The latter raises the effective price of private consumption and lowers productivity. It is therefore possible for a higher real wage to be associated with lower real private consumption.

In this setting, the scope for an incomes policy is therefore increased because a reduction in inflation enhances productivity. This allows private consumption to rise for a given level of government consumption. Even in this case, an incomes policy by itself can reduce the rate of money growth and inflation because it directly affects the government's fiscal position.

IV. Real Wages and Capital Depreciation: an Example

Even if firms have to pay a certain fraction of their revenues as profit taxes, the existence of "excessive" wage claims can still imply negative consequences for macroeconomic performance. For example, managers may reconcile incompatible claims on the firm's income from government and workers by foregoing capital maintenance. This process will lead to capital decumulation and ultimately lower output, consumption and real wages. Capital maintenance might be foregone, for example, because managers and workers no longer have a long-run interest in state enterprises if they expect them to be privatized (and run by different managers) or even shut down. As stressed by Lane (1991a) among many others, foregoing capital maintenance is a way for current "stakeholders" to appropriate the firms' assets. It is possible to view the capital depreciation process in a different light: state-owned enterprises may have to undertake new investment in order to respond to a drastic change in the economic environment. With respect to the pre-reform situation, the rate of depreciation of existing capital can be much higher for a certain period of time, as production is reorganized. It follows that wage awards and tax claims that were compatible with capital maintenance in a pre-reform situation may have to be curtailed, at least temporarily, after liberalization.

In this section we construct an example in which real wages cannot be systematically affected by inflation, and in which tax and wage claims on state enterprises' output may exceed net production, implying capital decumulation. This example is partly motivated by the experience in reforming FCP economies where the tax burden on state-owned enterprises has been high and where wage claims, after an initial fall, have risen even

though output has been falling. 1/ The model is only suggestive of the dynamics that this situation may set in train, since for the sake of tractability it relies on restrictive assumptions.

Suppose that capital depreciation allowances are tax deductible, but that state-owned enterprises have to pay a certain minimum level of "profit tax" to be allowed to choose their wage policy. For example, suppose that firms have to pay p_t (y_t - w_t^{eq}) in profit tax, where w_t^{eq} is the competitive real wage determined in equation (10). Tax revenues are then given by:

$$T_t = P_t(y_t - w_t^{eq}) = P_t[y_t - (1-\alpha)Ak_t^{\alpha}] \tag{23}$$

Note that this tax policy is equivalent to a 100 percent tax (subsidy) levied on wage payments above (below) the "competitive" level, since $y_t - w_t^{eq} = (y_t - w_t) + (w_t - w_t^{eq})$. 2/ For this example, we also modify the government expenditure equation by assuming that real government consumption corresponds to the competitive share of capital in output: 3/

$$c_t^g = \alpha Ak_t^{\alpha} - \delta k_t \tag{24}$$

1/ On Poland see for example Schaffer (1992a, b). On Czechoslovakia, Bulgaria and Romania see Borensztein, Demekas and Ostry (1992). Commander and Coricelli (1992) compare the Polish and the Hungarian experiences.

2/ We could also consider the imposition of a different sort of "excess wage tax". In this setup, however, such an extension would not be very informative. The reason is that our model takes wage claims as given, while an excess wage tax has the purpose of modifying wage claims and the firms' willingness to grant them. Commander, Coricelli and Stähr (1992), and Lane (1991a) analyze the impact of different tax rules on wage increases in reforming socialist economies. The Polish experience suggests that excess wage increases will sometimes be granted even with high "excess wage taxes".

3/ This assumption simplifies the model considerably. Together with the assumed form of the profit tax, this implies that the economy is running a structural budget deficit (see equation 27 below). Alternatively, we could assume that the government's consumption is such that the budget is balanced when wages are at their "competitive" level, without altering the substance of the results. If government consumption is assumed to be fully exogenous, the model becomes more cumbersome but the qualitative nature of the results is not altered.

This implies that the economy's resource constraint (9) can be expressed as:

$$\dot{k}_t = (1-\alpha) A k_t^{\alpha} - c_t \tag{25}$$

The path of capital can also be derived by considering the state enterprises' balance sheet and noting that gross capital accumulation is the residual after subtracting wage and tax payments from revenues. If this residual is insufficient to finance capital depreciation the capital stock will shrink, and vice versa.

The government also implements transfers to private agents, which are proportional to wages, so that

$$G_t = C_t^g + bW_t \tag{26}$$

The budget deficit is determined using (23), (24) and (26), and is given by:

$$\dot{M}_t^s = bW_t \tag{27}$$

Equation (27) shows that seigniorage revenue finances transfers to workers. Using (27) and the individuals' budget constraint (8), and imposing money market equilibrium, one notices that private consumption will always be equal to the real wage:

$$c_t = w_t \tag{28}$$

Substituting (28) into (16), we can determine that in a steady state (should one exist) the inflation rate will be given by:

$$\pi^{SS} = \frac{b}{a} \tag{29}$$

The parameter b represents the structural budget deficit and therefore money creation, while a is the inverse of the (constant) velocity of money.

We need now to specify how wages are determined in this FCP economy. In line with the previous section, suppose that the initial level of the real wage is higher than the competitive level, so that

$$w_0 = (1-\beta)Ak_0^{\alpha} \qquad \beta < \alpha \tag{30}$$

The initial quantity of money M_0 and capital stock k_0 are given. Initial private consumption is also determined, since consumption and the real wage are equal and the latter is given by (30). The price level is determined through the C-A constraint (7), imposing money-market equilibrium. The real wage is given by (30). We can use (28), (30) and the C-A constraint (7) to determine:

$$P_0 = \frac{M_0}{a(1-\beta)Ak_0^{\alpha}} \tag{31}$$

$$c_0 = w_0 = (1-\beta)Ak_0^{\alpha}$$

In order to study the dynamics of the system we need to postulate how wage behavior evolves over time.

1. Unsustainable wage awards

If workers set the real wage in every period at a level higher than the competitive one, as in (30), regardless of the excess wage tax, no steady state will exist. Instead, output and consumption will decline continuously. The reason is simple: a steady state equilibrium requires private consumption to be equal to the "competitive" labor share, since government's consumption is equal to the competitive capital share. However, (28) implies that the real wage is equal to private consumption, so that when the real wage is too high (as is the case here) private and public consumption sum up to more than net output. This in turn implies that the capital stock must be shrinking. In the model, there is no "adjustment mechanism" which modifies the workers' or the government's claims on output as output shrinks. Consequently, the shares demanded sum up to more than net output in every period, driving the capital stock to zero. In fact, substituting the real wage (30) into the economy's resource constraint (25) and using the fact that the real wage is equal to real

consumption (equation 28), one obtains the following dynamic equation for capital:

$$\dot{k}_t = -(\alpha - \beta) A k_t^{\alpha} \tag{32}$$

The dynamics of consumption are easily determined by differentiating with respect to time the equality $c_t = (1 - \beta)Ak_t^{\alpha}$, and using (32):

$$\frac{\dot{c}_t}{c_t} = -\alpha(\alpha - \beta) A k_t^{\alpha - 1} \tag{33}$$

Consumption will therefore be shrinking over time, along with capital and net output, at a rate which is higher the larger is the difference between the actual and the competitive wage (this difference is proportional to $\alpha - \beta$). Finally, the dynamics of inflation are determined using (16), (28) and (31):

$$\pi_t = \frac{b}{a} + \alpha(\alpha - \beta) A k_t^{\alpha - 1} \tag{34}$$

Equation (34) shows that inflation will be positive and rising over time. Suppose, for example, that the government does not make any transfers to workers ($b = 0$). In this case the money supply is constant but inflation is still positive, because output is shrinking over time (see equation 32). The impact of benefits that are proportional to the nominal wage rate is simply to raise inflation.

2. Wage Dynamics, Incomes Policy and the Path of Capital and Inflation

The assumption that workers obtain a real wage that is a fixed fraction of output, irrespective of its level, is too mechanical and unrealistic. It seems reasonable to assume that state enterprises, faced with shrinking capital and an excess wage tax, will try to resist wage pressures, or that workers will moderate their claims when output is falling. We therefore relax the assumption that workers are able to obtain their desired real wage in every period. We assume instead that the nominal wage responds to the gap between the actual and desired real wage, where the latter depends on the level of output:

$$\frac{\dot{W}_t}{W_t} = \epsilon \pi_t + (1-\epsilon)\frac{b}{a} + \phi'_t(\omega_t - w_t)$$
$$\omega_t = \omega + \gamma(x_t - x_0) \quad ; \quad \phi'_t = \frac{\phi}{w_t} \tag{35}$$

where ω_t is the desired real wage and x_t is gross output at time t, therefore equal to Ak_t^{α}. 1/ When output is above (below) its initial level, the target real wage is adjusted upwards (downwards) from its initial target level ω. One justification is that managers may resist wage increases when output is low. Another is that workers' real wage claims take into account the overall economic situation. Casual empiricism suggests that this assumption is reasonable; in countries such as Poland, Czechoslovakia and Bulgaria the output decline following price liberalization was accompanied by a large fall in real wages. Allowing the target real wage to respond sufficiently to output is essential for the stability of the model. The time-varying parameter ϕ_t' represents the speed of adjustment of nominal wages to the gap between the actual and desired real wage, and is assumed to be inversely proportional to the real wage; that is, the adjustment is faster the lower the real wage. 2/ Equation (35) implies that the nominal wage is partially indexed and that it follows a trend which is given by the steady state level of inflation, b/a. With respect to the wage-setting equation (20) in the previous section there are two differences: (i) the desired real wage is not fixed but depends on the current economic situation; (ii) since the unindexed part of the nominal wage grows at the same rate as money growth, inflation cannot systematically lower the real wage in a steady state.

To summarize, the initial quantity of money M_0 and of capital k_0 are given, along with the real wage w_0. The system is composed of a dynamic wage equation (35), a money creation equation (27), a binding C-A constraint (7), an instantaneous budget constraint for individuals (8), a dynamic resource constraint (25), and a money market equilibrium condition. Combining the money creation equation (27) with the C-A constraint (7) and the equality (28) between real wages and consumption, the rate of growth of money supply be expressed as follows:

1/ The results are not affected by focusing on gross output instead of net output, but the algebra is considerably simpler.

2/ This assumption ensures that the time derivative of consumption is linear in consumption and output (see equation (40) below), making it unnecessary to linearize the differential equation driving consumption around the steady state. The results are qualitatively unaffected.

$$\frac{\dot{M}_t}{M_t} = \frac{b}{a} \tag{36}$$

The dynamics of inflation can be obtained by using the workers' budget constraint (expressed as in (16)), and combining it with the equality (28) between real wages and consumption:

$$\pi_t = \frac{b}{a} - \frac{\dot{c}_t}{c_t} \tag{37}$$

Equation (37) shows that inflation will be above the constant money growth rate as long as real consumption is falling. This happens because individuals have to hold real money balances equal to a constant fraction of private consumption. When consumption is reduced, individuals reduce their money holdings, implying that prices will rise faster than money growth.

Finally, the dynamic behavior of private consumption will coincide with the dynamic behavior of the real wage, since--as shown in equation (28)--the real wage and consumption are always equal:

$$\frac{\dot{c}_t}{c_t} = \frac{\dot{W}_t}{W_t} - \dot{\pi}_t \tag{38}$$

Private consumption will be falling when inflation is higher than nominal wage growth. Substituting the dynamic equation for the nominal wage (35) into (38) and using (37) and the equality between consumption and the real wage, the rate of growth of real private consumption can be expressed as follows:

$$\dot{c}_t = \frac{\phi}{\epsilon} [\omega - c_t + \gamma(x_t - x_0)] \tag{39}$$

We now study the dynamic system consisting of the capital accumulation equation (25), the consumption dynamics equation (39), and the inflation dynamics equation (37), given the initial conditions determined in (31),

focusing first on the steady state and then on the dynamics. For simplicity we will focus on the dynamics of gross output x_t instead of capital k_t.

a. The Steady State

The steady state values of gross output, consumption and inflation are easily obtained by setting the rate of change of private consumption and capital in equations (25) and (39) equal to zero:

$$
\begin{aligned}
x^{SS} &= x_0 - \frac{\omega - (1-\alpha)x_0}{\gamma - (1-\alpha)} \\
w^{SS} &= c^{SS} = (1-\alpha)x^{SS} \\
\pi^{SS} &= \left(\frac{\dot{W}}{W}\right)^{SS} = \frac{b}{a}
\end{aligned}
\tag{40}
$$

The solutions (40) show that the steady state levels of consumption and of output are inversely related to the target real wage. The intuition behind this surprising result runs as follows: in a steady state, the real wage cannot be equal to its target level since the latter implies claims on real income that are incompatible with a constant capital stock (see equation (35)). The real wage must therefore be lower than the target one. But this can happen only if output is below its optimal level, so that the upward pressure on the real wage generated by the positive gap between the desired and actual wage is compensated by the downward pressure generated by the low level of output. For a given difference between the target real wage ω and the competitive real wage $(1 - \alpha)x_0$, the gap between actual output and optimal output will be larger the smaller is γ, which reflects the sensitivity of wage dynamics to output conditions. If the desired real wage is not very sensitive to output conditions, output must be very low to ensure that the desired real wage and the actual real wage coincide.

In this model, incomes policy by itself can affect the steady state only if it can affect the target real wage or the responsiveness of wages to output conditions. In order to improve the economy's macroeconomic performance the target real wage has to be lowered; the closer is the real wage to the competitive real wage, the higher is the level of capital and output. By contrast, an incomes policy based on a lowering of the indexation parameter does not affect the steady state. This happens because in equation (35) nominal wages are assumed to respond one-for-one to a weighted average of actual and trend inflation. Since actual and trend inflation coincide in a steady state, neither steady state real wages nor

any other real variables depend on the indexation parameter. 1/ However, the degree of wage indexation can play an important role because it affects the convergence process and because it may affect the stability of the steady state equilibrium, as we show below.

b. The dynamics of the system

The initial conditions of the system are described at the beginning of this section. To summarize, the economy has a "structural" budget deficit equal to real transfer payments, which implies a given equilibrium rate of inflation. However, the initial real wage is too high; we study the dynamic behavior of the economy over time and analyze how this behavior can be affected by incomes policy measures.

Using (40), the dynamic equation for consumption (39) can be re-written as follows:

$$\dot{c}_t = \frac{\phi}{\epsilon} [\gamma(x_t - x^{SS}) - (c_t - c^{SS})] \tag{41}$$

The dynamic equation for capital (25), expressed in terms of gross output, becomes:

$$\dot{x}_t = \alpha A^{1/\alpha} x_t^{1-1/\alpha} [(1-\alpha) x_t - c_t] \tag{42}$$

Equation (42) indicates that the rate of change of output depends negatively on its level. We take a first-order Taylor expansion of the RHS of (42) around the steady state values x^{SS} and c^{SS} to study the local stability properties of the equilibrium:

$$\dot{x}_t \simeq Z [(1-\alpha)(x_t - x^{SS}) - (c_t - c^{SS})] \qquad Z = \alpha A^{1/\alpha} (x^{SS})^{1-1/\alpha} \tag{43}$$

Will the economy eventually reach the steady state? The answer depends on the values of the parameters. Under appropriate assumptions about parameter values, the steady state equilibrium will be locally stable. We

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1/ By contrast, in the model of section III.b.2 the rate of money growth is not exogenous, as in this case, and the steady state rate of inflation depends on the degree of wage indexation.

consider two cases: (1) The initial real wage is too high, and the target real wage is higher than the competitive one, that is, $\omega = w_0 > (1 - \alpha) x_0$; (2) The initial real wage is too high, but the target real wage is the competitive one, $w_0 = (1-\beta)x_0$ and $\omega = (1 - \alpha) x_0$.

The basic difference between the two cases is that in the first there is a "structural" disequilibrium in real wage demands, while in the second there is only an initial disequilibrium. This means that in the first case the economy converges to an equilibrium with a level of output lower than the initial one, while in the second the final level of output is the same as the initial one, as we can infer from the steady state values of output and consumption in (40).

Case 1 (Figures 2a and 2b):

Initially, the economy is at point A. Since the real wage is "too high" real private and public consumption add up to more than net output: hence there is decumulation of the capital stock. With the capital stock declining, the real wage and consumption start to fall as well, since nominal (and real) wages respond to output conditions. 1/ The fall in real wages is reinforced by higher inflation, caused by the fact that money growth is constant but output is falling. These two effects make private consumption fall more quickly than real output. There are now two distinct possibilities:

(1a) Output and private consumption fall monotonically until they reach a new steady state at point B (Figure 2a).

(1b) Since private consumption falls more rapidly than output, the latter starts to recover first (Figure 2b). Once output has recovered, consumption starts recovering as well--nominal wages respond to increasing output and inflation starts falling. When output reaches its new steady state level consumption is still too low, and therefore capital and output keep rising--and inflation falling--driving up consumption. At some point, rising consumption will imply that capital starts falling again; this slows the growth in consumption until consumption starts to fall as well. We are now back in a situation analogous to the initial one: the economy is exhibiting cyclical behavior. These cycles can be dampened over time, as in Figure 2b, with the economy reaching the steady state at point B, or explosive depending on the values of the parameters.

Appendix II contains the conditions for local stability of the steady state equilibrium. The equilibrium will be stable if ϕ is large and γ sufficiently large. The model is clearly unstable if γ equals 0--the real wage cannot be equal to its target level with the capital stock constant

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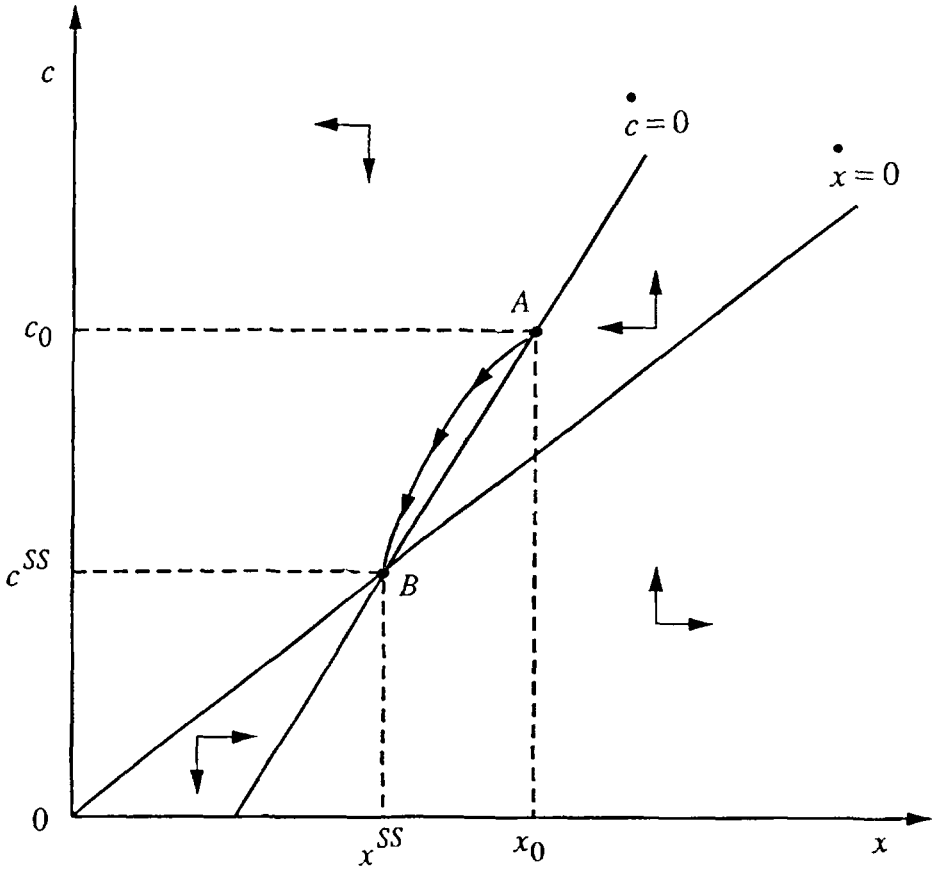
1/ Note that if the initial real wage were below the target real wage, consumption and the real wage would initially rise (while capital starts falling) and then fall and follow the path just described.

Figure 2a
High Initial Real Wage, High Target Real Wage



Path of Consumption, Output and Inflation over Time

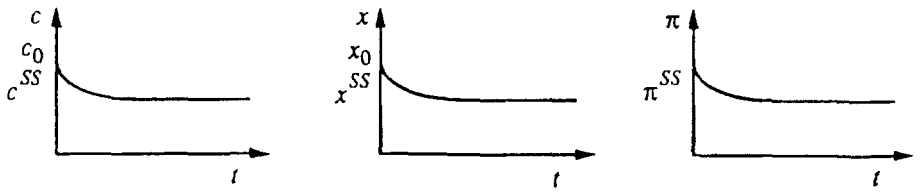
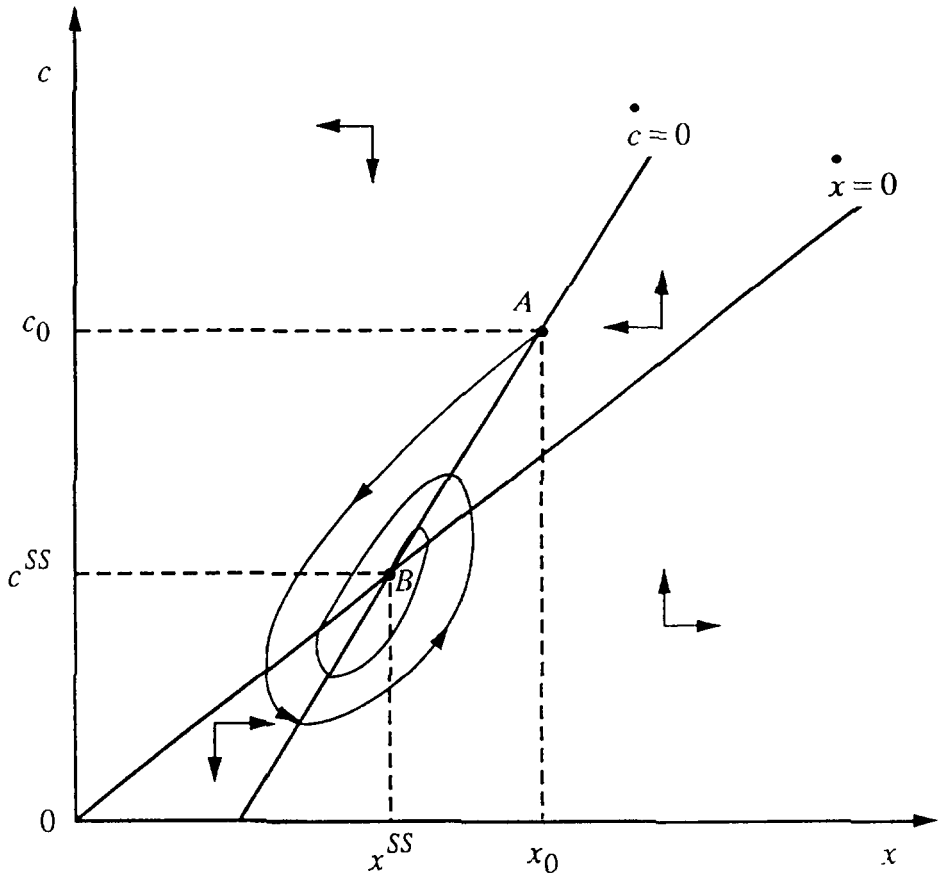
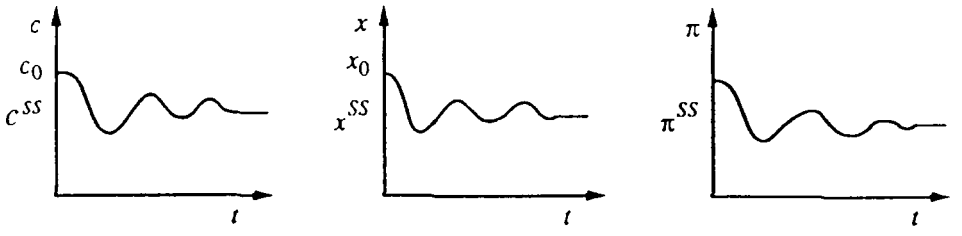


Figure 2b
High Initial Real Wage, High Target Real Wage (Cycles)



Path of Consumption, Output and Inflation over Time



over time. A high value of the indexation parameter makes it more likely that the economy will exhibit unstable behavior. The explanation is simple. When output is low, inflation is high (remember that money growth is constant). If the real wage is not significantly affected by inflation, the only drag on real wages is the low level of output. This hampers the adjustment--output has to fall by more before it starts recovering. A lower indexation parameter does not however imply quicker convergence to the steady state. The speed of convergence is faster initially, but slower thereafter.

Case 2 (Figure 3):

The main difference from the previous case is that the steady state level of output is the same as the initial one. The economy is initially at point A. The initial dynamics are perfectly analogous: because the initial real wage is too high, private consumption is too high and therefore capital and output decline. The decline in output causes both an increase in inflation and wage moderation, implying falling real wages and private consumption. This rules out a scenario like case 1a above (we know that the steady state level of output is the initial one, so output has to recover at some point). Again, consumption falls more rapidly than output. Once consumption has fallen by enough, capital and output start to recover while inflation falls below the steady state level. As in the previous case, here there are two possibilities:

(2a) capital, private consumption and inflation rise until they reach the steady state at point B, as shown in Figure 3;

(2b) the same process will be at work, but this time when output reaches its steady state level private consumption is still too low, implying that output and consumption continue to rise. Once consumption has risen by enough output starts falling again, followed by consumption. We are now back to the initial situation. The economy will exhibit cyclical behavior, with cycles which could be convergent or divergent depending on the values of the parameters. 1/

The conditions for stability are very similar to case 1. The difference between cases 1 and 2 when the system is stable is that in the first case consumption and output fall monotonically to the (sub-optimal) steady state level, as shown in the bottom panel of Figure 2a, while in the second case consumption (and therefore the real wage) needs to undershoot the long-run equilibrium level to allow for the initial capital decumulation to be reversed, as shown in the bottom panel of Figure 3. This result is similar to that obtained by Lin and Osband (1992) in a different context. They show that in the presence of an initial monetary overhang,

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1/ The cyclical dynamics are not shown in Figure 3, since they are similar to those in Figure 2b.

the real wage must initially be below its long-run level to allow the overhang to be "worked out".

c. Implications for incomes policy

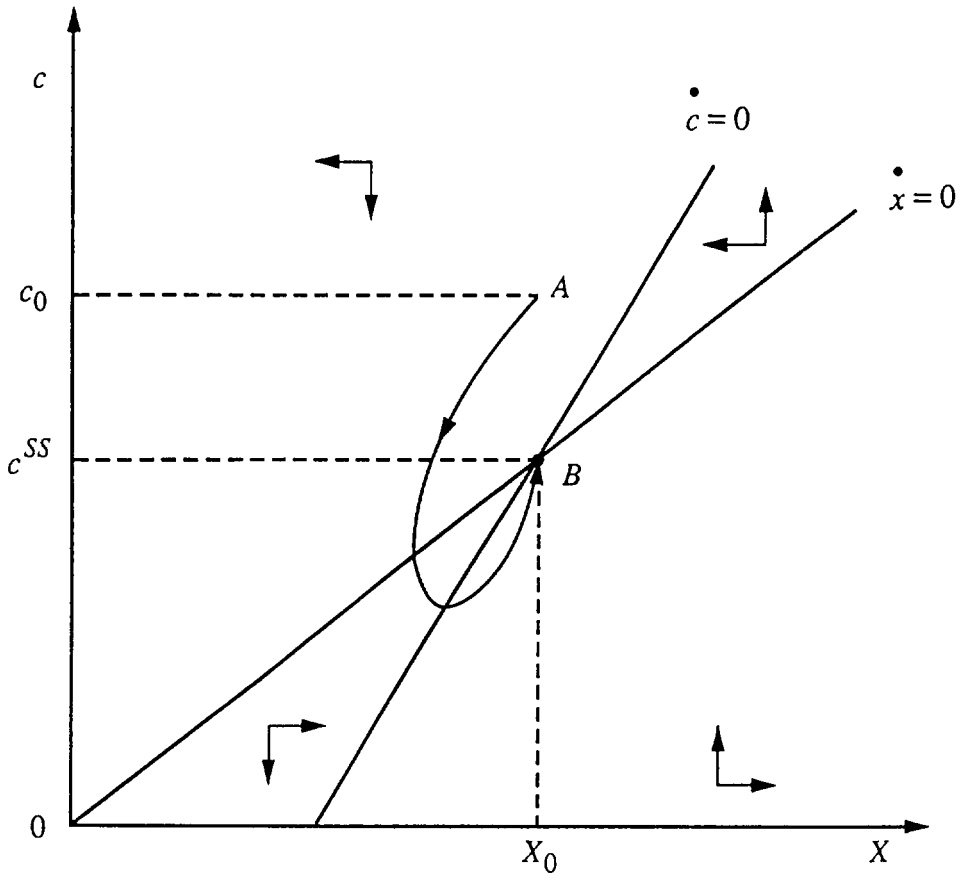
We will first consider how the adoption of incomes policy measures in an initial disequilibrium situation affects the dynamic behavior of the economy, and then focus on the impact of incomes policy measures accompanying a disinflation program, starting from an initial inflationary equilibrium.

(i) Initial Disequilibrium Situation: If the disequilibrium is structural (Case 1 above) a reduction in the degree of indexation will not prevent output from falling. The decline in output can be reduced by making the real wage more responsive to output conditions (that is, by raising γ). A higher γ implies that for a given excessively high target real wage, a smaller gap between actual and initial output is sufficient to prevent the real wage from rising.

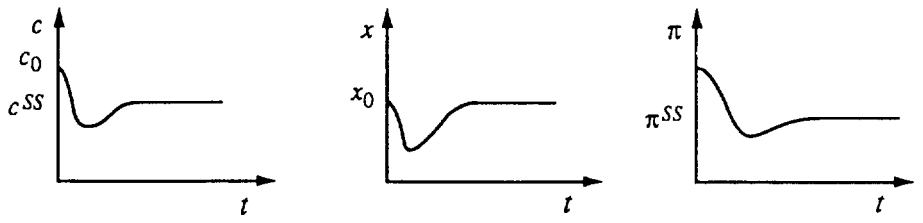
If the disequilibrium is not structural (Case 2 above) a reduction in the indexation parameter will speed the path towards the steady state by ensuring that the real wage--and hence real consumption--react more rapidly to gaps between actual and optimal output, and the actual and desired real wage. This means that consumption will fall faster the lower the indexation parameter (equation (41)), and that output will therefore fall by less before it starts recovering. The cycle shown in Figure 3 will be dampened. Also, the overall fall in private consumption is lower when indexation is lower; intuitively, since output falls by less, private consumption falls by less. A lower indexation parameter will initially cause higher inflation, since consumption falls initially at a faster rate and individuals reduce their money holdings; however, inflation will be less persistent. The initial rise in inflation will ensure that real wages are brought back to a level compatible with macroeconomic equilibrium.

Some general implications of this analysis are worth stressing. An incomes policy that makes real wages more responsive to macroeconomic conditions (that is, raising γ) can improve economic performance both during the transition process (see the discussion above) and in the steady state (equation (40)). However, this will not be sufficient to restore output to its initial level unless the target real wage is at a level compatible with market clearing in a competitive setting. The reason is that output needs to be lower in order to contain real wage pressures. If the initial disequilibrium situation is temporary, a reduction in the degree of wage indexation will speed up the transition process and limit the "cycle" in output and private consumption. If real wage demands are systematically excessive, a reduction in wage indexation will not prevent output from falling. However, it is possible that a high degree of wage indexation would make the model unstable. In this case, a reduction in the degree of indexation would be essential in order to ensure that the economy would reach the steady state.

Figure 3
High Initial Real Wage, "Competitive" Target Real Wage



Path of Consumption, Output and Inflation over Time



(ii) Initial Equilibrium Situation: Suppose that the government reduces the budget deficit by lowering transfers to workers and that the trend in nominal wages reflects the lower rate of money creation. In this case, the rate of inflation will fall to its new steady state level without any effect on the path of real wages or consumption. In other words, the lower incidence of the inflation tax will fully compensate workers for the lower transfers. An incomes policy targeted at lowering the indexation parameter would have no effect whatsoever. The reason is that inflation is reduced once and for all to its new steady state level, implying that the real wage is unaffected. One should of course stress that although in this model a reduction in wage benefits does not affect aggregate private consumption, it may have redistributive aspects if benefits also accrue to non-workers.

Finally, in this model an incomes policy based on a reduction of the indexation parameter by itself cannot systematically lower the rate of inflation. The reason is that there is a structural fiscal deficit (equation (27)) and therefore a positive rate of money growth (equation (36)). This result is in contrast with the one obtained in the previous section using a model without capital depreciation. The explanation for the difference is simple: in the model of Section III the government budget is in deficit only if real wage claims are excessive, while in this section the budget is structurally in deficit. Furthermore, in the model of Section III a reduction in the indexation parameter can reduce real wages permanently, while in the model of this section this is not possible because the nominal wage in the steady state increases one-for-one with the rate of inflation.

V. Conclusions

Many experts and writers on the problems of economic transformation in Central and Eastern Europe have stressed the importance of the corporate governance problem in state enterprises. This problem can result in excessive wage claims and/or capital decumulation if workers and managers try to appropriate the enterprises' assets. Excessive wage claims, by reducing profits, will also reduce government revenue from the profit tax, generating a fiscal problem. This paper provides a simple framework to study these issues, starting from the assumption that wage claims are indeed "excessive". It then indicates the possible consequences for the government budget in a FCP economy--through a shortfall in profit tax revenue--and capital decumulation, if firms forego capital maintenance to keep up with wage and tax payments. It also studies the role of wage controls in stabilization. The intensity of the fiscal and recessionary problems depends on the size of excessive wage claims, on workers' ability to obtain the desired real wage, and on the sensitivity of wage claims to macroeconomic conditions. If initial wage claims are "too high", the capital stock may start to fall and the economy can end up in a low-output steady state.

An incomes policy that affects wage behavior by reducing the degree of indexation can speed the economy's convergence to a low-inflation equili-

brium and--under certain circumstances--can affect the nature of the equilibrium itself. Whether the degree of wage indexation has an impact on the steady state level of output, consumption, and inflation basically depends on whether workers are able to "protect" their real wages from trend price increases. If inflation can systematically affect real wages--as in the model of section III--then lowering the indexation parameter can lower the steady state inflation rate. If, instead, steady state real wages are not affected by the inflation rate, then lowering the indexation parameter can only affect the transition path of the economy to a steady state, but not the steady state itself. Furthermore, a reduction in wage indexation can be appropriate if real wage claims are only temporarily high, but is of limited help if they are systematically excessive. An important qualification is that--even in the latter case--a higher indexation parameter may imply instability.

Making the real wage more responsive to output conditions may help to contain an output decline triggered by excessive wage and tax claims on state enterprises' resources. Incomes policy by itself can reduce inflation because of the link between wage claims and the government fiscal position (and money creation) through the impact of wages on profit tax revenue. If the government budget is in structural deficit, then regardless of the strength of wage claims a reduction in the rate of inflation can only be achieved by fiscal tightening. Even in this case, however, an appropriately designed incomes policy can still strengthen the level of output by ensuring that firms have enough resources to finance capital accumulation. These conclusions regarding incomes policy need to be qualified by emphasizing that they are obtained by simply modifying exogenous wage behavior in line with the incomes policy restriction.

The usefulness of wage controls in this model clearly depends on the existence of excessive wage claims. A more complete analysis would point out the distortions introduced by wage controls on the allocation of labor, the enforceability of controls and their proper design. Experience suggests that the effectiveness of wage controls declines over time, while the induced distortions--for example in labor allocation--increase. This suggests that an incomes policy can provide only a temporary support to a stabilization program in a formerly centrally planned economy. Solving the problem of the proprietary structure of state-owned enterprises and implementing tax reforms are therefore urgent tasks.

The model has several other shortcomings, which point to useful future extensions. It focuses only on state enterprises and assumes constant employment; thus it completely ignores the reallocation of human and capital resources to the private sector, as well as the role of unemployment. 1/ Also, labor is assumed to be the only purchased input in the production

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1/ In this context, a reduction in the capital stock in the state enterprise sector because of re-allocation of resources to the private sector would indeed be desirable.

process: for firms in which labor costs are a small fraction of total costs the problems outlined above become less relevant. Furthermore, there are no explicit intertemporal issues in consumption decisions. Workers are assumed to "save" only to satisfy the cash-in-advance constraint. Nevertheless, the model can provide some interesting insights not only on the impact of wage behavior and incomes policy on output and inflation, but also on issues not explicitly treated here, such as the interaction between incomes policy and exchange rate policy. The model is based on the stylized features of a FCP economy. As long as fiscal revenues are heavily dependent on the profit tax and no developed bond market exists, monetary policy becomes endogenous--it is directly affected by wage developments. It follows that the feasibility--and therefore the credibility--of a restrictive monetary stance to support the exchange rate is doubtful if there is a potential for excessive wage claims. For example, an obvious implication of the model is that the direct impact of wages on the budget could imply a rapid loss in foreign exchange reserves and a balance of payments crisis if wages were set too high. This argument suggests that, in the presence of a corporate governance problem that generates excessive wage claims, it may be advisable to accompany a fixed exchange rate anchor, or a crawling peg, with wage controls. Of course, in a longer-term perspective, ensuring the effectiveness of fiscal and monetary policy requires the implementation of tax reforms and the solution of the corporate governance problem.

The Impact of Inflation on Output

Assume that inflation has a negative impact on overall productivity and that, for simplicity, public consumption is a constant fraction α of output:

$$c_t = y_t(\pi_t) - c_t^g = (1-\alpha)\, y_t(\pi_t) \tag{A1}$$

It follows that changes in private consumption can be expressed as follows:

$$\dot{c}_t = (1-\alpha)\, y_t = (1-\alpha)\, y'_t \dot{\pi}_t \tag{A2}$$

where y'_t is the derivative of output with respect to inflation. Using this equation and the consumers' budget constraint, one can write:

$$\dot{\pi}_t = [-(1-\alpha)\, y'_t]^{-1} [(1-\alpha)\, y(\pi_t)\,(1+a\pi_t) - (1+b)\, w_t] \tag{A3}$$

The other dynamic equation relating real wages and inflation is obtained from equation (20) in Section III.2:

$$\frac{\dot{w}_t}{w_t} = \phi\,(\omega - w_t) - (1-\epsilon)\,\pi_t \tag{A4}$$

The locus of points in (π, w) space along which inflation is constant, obtained by setting (A3) equal to zero, is highly non-linear. The intersection of this locus with the locus of points obtained by setting (A4) equal to zero, determines the steady state level of inflation and real wages. The steady state level of output is immediately determined as a function of steady state inflation. If for example y' does not depend on inflation and the impact of inflation on output is relatively small, a higher target real wage will imply a higher equilibrium rate of inflation and a lower level of private consumption.

Local Stability of The Steady State

The matrix of coefficients of the linear system of differential equations (42) and (44) is given by:

$$A = \begin{bmatrix} -\phi/\epsilon & \gamma\phi/\epsilon \\ -Z & Z(1-\alpha) \end{bmatrix} \tag{A5}$$

The eigenvalues of this matrix can be determined as the solutions for λ to the equation

$$|\lambda I - A| = 0 \tag{A6}$$

where I is the identity matrix. These solutions are given by:

$$\lambda = \frac{1}{2}\left(-[\phi/\epsilon - Z(1-\alpha)] \pm \sqrt{[\phi/\epsilon - Z(1-\alpha)]^2 - 4Z\phi/\epsilon[\gamma - (1-\alpha)]}\right) \tag{A7}$$

The solutions for the path of consumption and output over time (or, more precisely, of their deviations from the steady state level) will take the form:

$$\begin{aligned} c_t - c^{SS} &= Ae^{\lambda_1 t} + Be^{\lambda_2 t} \\ x_t - x^{SS} &= Ce^{\lambda_1 t} + De^{\lambda_2 t} \end{aligned} \tag{A8}$$

where A, B, C and D are constant parameters that are determined by ensuring that (A14) satisfies both the initial conditions and the differential equations. In order to have smooth convergence to the steady state equilibrium, both eigenvalues must be real and negative, so that the variables c and x converge to their steady state level over time. The necessary and sufficient conditions for this to happen are:

$$\phi > \epsilon Z(1-\alpha)$$
$$\gamma \leq 1-\alpha+\frac{\epsilon}{4Z\phi}\left[\frac{\phi}{\epsilon}-Z(1-\alpha)\right]^2 \qquad \text{(A9)}$$

If instead

$$\gamma > 1-\alpha+\frac{\epsilon}{4Z\phi}\left[\frac{\phi}{\epsilon}-Z(1-\alpha)\right]^2 \qquad \text{(A10)}$$

the solutions will have a negative real part and a complex part, implying cyclical behavior: as long as $\phi/\epsilon > Z\ (1 - \alpha)$ the cycles will be dampened over time, with consumption and output converging to the steady state equilibrium.

A Closer Look at the Government Budget

In the text of the paper, we have made restrictive assumptions about the government budget. In the model of the Section, for example, the budget deficit is always equal to government benefits, which are a constant fraction of the wage bill. This implies that the path of the real deficit coincides with the path of real wages (and hence private consumption). This section sketches a more flexible and general specification of government revenues and expenditure, while maintaining the assumption that revenue sources are the profit and payroll taxes, and that government expenditure is the sum of government consumption and social benefits:

$$T_t = \theta_p (p_t y_t - W_t) + \theta_w W_t \tag{A11}$$

$$G_t = bW_t + C_t^g \tag{A12}$$

where θ_p and θ_w are the tax rates on profits and wages respectively. The budget deficit is then given by:

$$G_t - T_t = [b + (\theta_p - \theta_w)]W_t + C_t^g - \theta_p p_t y_t \tag{A13}$$

This expression highlights the channels through which the dynamics of wages affect the fiscal deficit. First, if the profit tax is higher than the payroll tax, higher wages will automatically imply lower after-tax profits for a given level of enterprise gross revenue, and therefore lower tax receipts for the government. This is the case analyzed in Sections III and IV (we have assumed that the profit tax is equal to one and the payroll tax to zero). If social benefits are automatically linked to wages (as is the case here) higher wages will also imply higher government outlays for social benefits.

In order to integrate this framework for the budget with our general model, we need to specify what happens to untaxed profits, since when the

profit tax is below unity, firms control a fraction of output. 1/ One possibility is to assume that a fraction β of untaxed profits is distributed to workers, and that enterprises have to finance capital maintenance with the residual fraction of untaxed profits. In this case the workers' disposable income is given by:

$$y_t^w = w_t [1 + b - \theta_w - \beta(1 - \theta_p)] + \beta(1 - \theta_p) y_t \qquad \text{(A14)}$$

If workers appropriate untaxed profits to the detriment of capital maintenance and upgrading, the outcome could be a process of inflation and capital decumulation similar to the one described in the previous section. 2/ Furthermore, wage controls would be ineffective if they failed to control the share of profits accruing to workers: this points to the necessity of an accurate design of incomes policy measures.

1/ When the profit tax was set equal to unity instead, once the wage policy was given it was not necessary to specify firms' behavior, since net capital accumulation was determined by the residual of gross output once taxes and wages had been taken out.

2/ If workers get a share of gross profits and capital depreciation is not deductible one should replace net output y_t with gross output x_t in equations (A13) and (A14).

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