Economic Discontent

versus

Social Commitment
In Economic Development

by

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Abstract

The paper investigates the role of social cohesion in economic development. We capture 'social cohesion' as society's willingness to accept lower wages to increase employment, and as its willingness to offer benefit payments to the unemployed. The lower the minimum wage rate and the higher the welfare payments, the more cohesive the society, and *vice versa*. We compare two economies which differ only in this respect. We analyze how they react to shocks of different magnitudes. We show that for minor disturbances the less cohesive economy exhibits superior performance, while the reverse becomes true as the size of the shock increases. The Central and Eastern European transition economies exemplify the argument.

JEL Classification: E24, O11, P17

1

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1   Introduction

Increasing attention is paid in the literature on endogenous growth to the fact that income per capita appears not to converge across countries in the long run, if one looks at the available data. While it is not clear whether 'convergence clubs' can be identified among countries with similar characteristics or in similar stages of development, or whether the available cross country data exhibits a pattern of stratification, increasing agreement exists that growth models even on the most basic level, where they have the property of convergence to the steady state for any one economy, should be able to also incorporate reasons for equilibrium growth rates to mimic the pattern of non-convergence of per capita incomes across nations. A variety of theoretical reasons are listed to this effect, the most common having to do with scale economies caused by complementarities in production, the particular way human capital is generated, or the uneven diffusion of technological change (Azariadis 1996).

A peculiar subset of countries appears to lend itself very naturally to a further exploration of hypotheses advanced in this respect – though it is not clear yet, whether they will ultimately confirm to the pattern observed on a world-wide scale. These are the so-called 'transition economies' in Europe and the former Soviet Union. The main reason why this group of countries ought to be of interest to those proposing alternative answers to the 'why-growth-rates-differ' puzzle, is that their economic performance differs greatly, even so their initial position was indeed comparable until only a few years ago.

One should not overstate the case; differences in national income levels as well as growth rates existed. However, the similarities appear striking. All member nations of the former Council for Mutual Economic Assistance (CMEA) were subject to central planning, and to the peculiar adjustment of the capital stock required by that economic regime (Rühl 1996); all were exposed to an initial shock and reform proposal which rendered parts of their industrial heritage useless and affected them in similar ways (Lipton and Sachs 1990); and the growth trajectory on which they initially were seen to embark, the famous J-curve, was understood to represent but alternative configurations of an identical and well defined set of parameters (Fischer and Gelb 1991).

Meanwhile, however, the picture is less clear. Table 1 groups the transition economies according to two basic indicators. One would be hard pressed to explain the significant spread in macroeconomic performance as the result only of their initial conditions. It is,

on the other hand, not obvious what caused the differences in economic policy, foreign direct investment, and the host of other factors responsible for the outcome in each case. This situation closely resembles the more general problem of non-convergence.
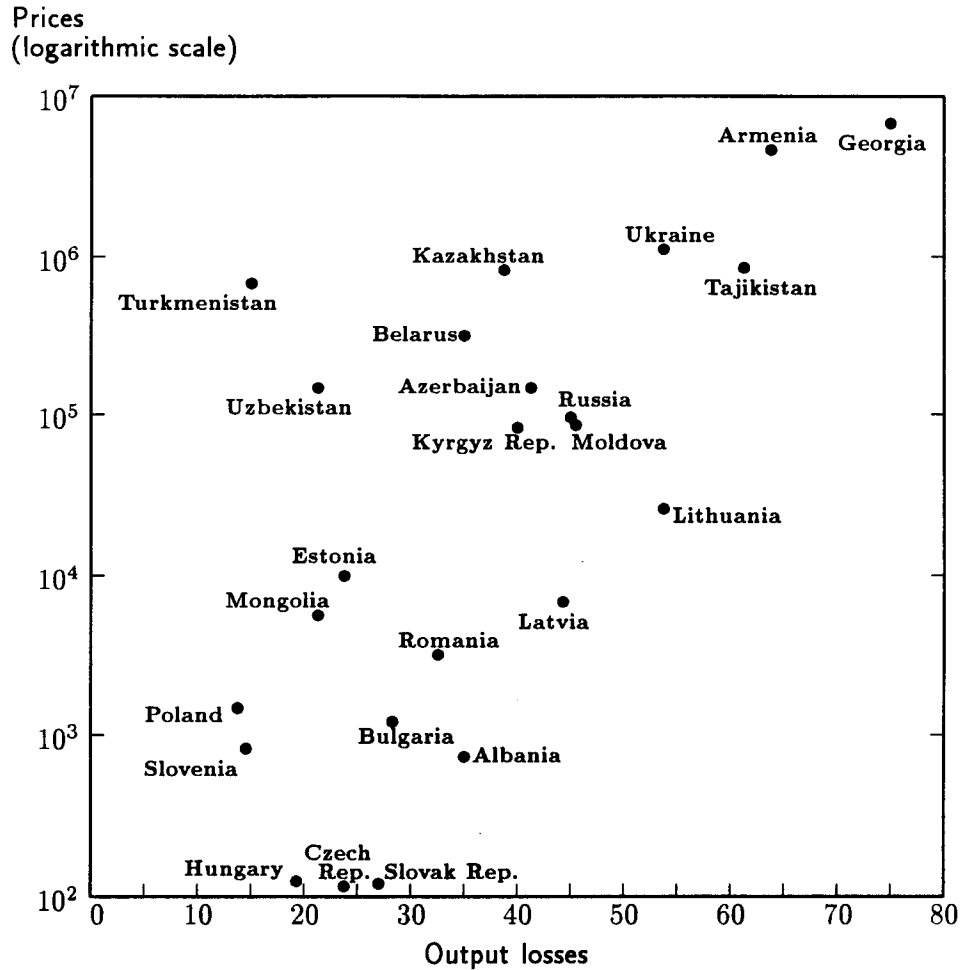
Prices
(logarithmic scale)

Table 1. *Transition economies: registered cumulative output losses and price changes (IMF 1994, World Economic Outlook).*

However, because of the initial similarities just mentioned and because of the short time span involved, this limited group of countries may lend itself easier to economic analysis. The situation provides conditions almost as close to an economist's laboratory as one can hope for.

The following addresses an explanation for different growth rates which, for a variety of reasons, has received comparatively little attention in the economics literature. Typically, in discussions among non-economists, sentiments referring to culture, social cohesion,

ethics, or even notions such as work effort and discipline loom large when differences in long term economic performance are at issue. The 'cultural lambda', evoked by Weitzman (1993) in order to capture the differences between China and Russia, may serve as an example for the difficulties encountered by economists trying to make operable these complex figures of speech.

We abstain from tacking on a general notion such as 'culture' to an economic model. Instead, we try to give meaning to the idea that *social cohesion* matters for aggregate economic performance by translating this notion into the well-known categories of a standard macroeconomic model. More precisely, we define the degree of cohesiveness of a society as its willingness to lower wages in order to increase employment and, at the same time, its readiness to accept welfare payments to those without work. In terms of economic modeling, this translates into the statement that the lower the minimum wage and the higher transfer payments, the more cohesive the society. Though the background for this discussion ultimately is the theory of economic growth, we provide here a comparative static model as the first step to explore in detail the role of these two parameters in determining the equilibrium outcome. The case of the transition economies guarantees an intuitively plausible illustration, but the model is sufficiently general to apply to other cases as well.

Part two specifies two economies, identical in every respect but their degree of cohesion, and details the initial disturbance they are exposed to. Part three compares their response pattern, as the magnitude of the shock is allowed to vary. Part three discusses the results by utilizing data available from seven central European economies.

2 A Tale of Two Economies

2.1 Defining Social Cohesion

The idea to express social cohesion in terms of a prevalent preference in society to avoid large income differentials seems a straight forward and well established use of the term. So is an explanation of minimum wages as reflecting the ability of insiders to impose their will upon the economy – at the expense of others who will go unemployed (Lindbeck and Snower 1988).

Minimum wages are a fact of life in all advanced industrial societies. Their existence is explained along at least two lines of reasoning. One part of their *reason d'être* is buttressed by the argument that minimum wages enforce a degree of equality in favor of those at the lower end of income distribution. In this view, a minimum wage stands for society's commitment toward a more egalitarian distribution of income. On the other hand, minimum wage requirements block entry to jobs which otherwise would be available, especially in times of economic duress. To explain this phenomenon as economically rational, it has been argued that they reflect the ability of those in employment (transmitted through trade unions or otherwise) to block others from eroding their distributive share. In this view, the existence of minimum wages expresses the discontent of insiders, asked to give up privileges.

In our example, welfare benefits assume the function of measuring the degree of *social commitment* directly. A society which is cohesive in the sense that it prefers to avoid a large spread at the lower end of income distribution will keep transfer payments higher than a society which does not share these preferences, all other things being equal. The level of the minimum wage, on the other hand, denotes the degree of *economic discontent*, just as suggested by insider-outsider models: It is set on behalf of those who have employment already, to defend their relative income position. In our context, high minimum wages thus denote a low degree of social cohesion.

In transition economies, minimum wages apply to the old sector, as long as hard budget constraints are not successfully enforced, and perhaps after that. They can be understood as the tendency of those in employment to defend their position. To bring out these facts as well as to recognize the 'two sides' of any minimum wage – to be a measure of insiders' power over outsiders, but also an instrument thought of as assuring income equality – we postulate that the minimum wage be in place only for the 'old' sector of the economy, i.e. for jobs inhered from the socialist period.

We specify two economies, denoted $\mathcal{A}$ and $\mathcal{B}$, which are equal in all respects but the degree of social cohesion. Social cohesion is ascertained in terms of a minimum real wage requirement $(\bar{w})$ and of transfer payments to the unemployed $(\bar{b})$. Both remain fixed.

Excluding the case in which wage and benefit differentials are of the same sign, i.e.

$$\frac{\bar{w}_{\mathcal{A}} - \bar{w}_{\mathcal{B}}}{\bar{b}_{\mathcal{A}} - \bar{b}_{\mathcal{B}}} > 0,$$

as too ambiguous to rank the economies in an unanimous fashion, we get the following

Definition 1 *Country $\mathcal{A}$ is more cohesive than country $\mathcal{B}$ iff $\bar{w}_{\mathcal{A}} < \bar{w}_{\mathcal{B}}$ and $\bar{b}_{\mathcal{A}} > \bar{b}_{\mathcal{B}}$.*

2.2 Specifying the Initial Disturbance

Both economies are transition economies. Their capital stock can be subdivided into two segments. One component, K_O, represents the initial capital stock, inherited from the period of central planning. K_N stands for new capital, i.e. the result of investment undertaken after reforms begun. We assume that K_N is exclusively the result of foreign ('Western') direct investment, reflecting the evaporation of domestic savings after price liberalization, as well as the low saving rates in the initial years of reform.

Production in each sector is modeled by 'well behaved' production functions, F_O, and F_N, with the sole inputs of labor, L_O and L_N, and capital, K_O and K_N. The productivity of both inputs is higher in the new sector, with $\rho_O < \rho_N$ denoting the productivity of labor. The condition that $\mathcal{A}$ and $\mathcal{B}$ be equal in all respects other than those designed to address the phenomenon of social cohesion translates into identical production functions in each sector for both economies

$$F_O^{\mathcal{A}} = F_O^{\mathcal{B}} \stackrel{\text{def}}{=} F_O, \quad F_N^{\mathcal{A}} = F_N^{\mathcal{B}} \stackrel{\text{def}}{=} F_N.$$

In both sectors

$$F'_K > 0, \quad F'_L > 0, \quad F''_{KK} < 0, \quad F''_{LL} < 0, \quad F'''_{LLL} > 0.$$

Both economies can also be described in terms of a common history. Since they are identical, this history includes equal quantities of capital and labor employed under central planning, as well as identical rates of remuneration. We assume that the beginning of reforms can be understood as a shock of identical magnitude. Historically, the onset of market reforms resembled a sequence of price liberalization, the introduction of hard budget constraints, and mass privatization programs. For the purpose of this paper we model the consequences of liberalization and the imposition of hard budget constraints *as if* both happened in one strike: The 'big bang' thus becomes the sudden exposure of two prototypical economies to international competition.

The beginning of reforms always meant that parts of the domestic capital stock became non-viable at the old wage rates. Reference to this fact allows us to give precise meaning to the nature of the 'shock' hitting both economies: It's magnitude is mirrored by the size of the remaining capital stock. In response, wages will fall but they can not fall below the minimum wage (recall that minimum wage rates may differ across the economies). There is no need to specify labor 'demand' and 'supply' under socialism. Important is only that capital can not be re-activated: That part of the old capital stock which became redundant when the economy was opened to international competition is lost for good. The smaller the available 'old' capital stock K_O at the beginning of the period we are interested in, the larger therefore the shock preceding that period.[1]

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[1]Alternatively, the initial shock may be conceived as the sudden (and irreversible) loss of output markets, that is, the loss of the segment of the old capital stock previously used to produce goods which ceased being demanded after the economy was opened to international competition. The important characteristic in both cases is that a further decline in wages can not lead to the reactivation of capital, once it has been scrapped.

We may then venture a first glimpse at the sequence of events. Starting out with an initial capital stock, K_O, itself the result of a previous and exogenous shock of given magnitude, labor demand at this capital stock is determined by its production function. Assuming that workers are paid their marginal product, labor demand in the old sector is thus determined by the following standard equation:

$$w = F'_{O_L}(L^d_O, \bar{K}_O). \tag{1}$$

Since the production function is strictly convex, the inverse to its first partial derivative exists and the demand for labor (given the old capital stock) thus can be depicted as

$$L^d_O = L^d_O(w, \bar{K}_O)$$

($\bar{K}_O$ in the notation will be omitted from now on).

Taking the first and the second derivatives of (1) with respect to wages, we can determine that

$$L^{d\prime}_O = \frac{1}{F''_{O_{LL}}} < 0,$$

$$L^{d\prime\prime}_O = -\frac{F'''_{O_{LLL}}}{F''_{O_{LL}}{}^3} > 0,$$

while labor supply, after socialism, can be depicted in the traditional way – as an increasing function of the real wage:

$$L^s = L^s(w), \quad L^{s\prime}(w) > 0, \quad L^{s\prime\prime}(w) < 0.$$

Whether unemployment is part of these initial conditions depends on the relation between the minimum wage and the equilibrium wage w^{eq} at which the labor market clears, with $\bar{w} \leq w^{eq}$ denoting the full employment condition, and unemployment defined as:

$$UE = \begin{cases} 0, & \text{if } \bar{w} \leq w^{eq}, \\ L^s(\bar{w}) - L^d_O(\bar{w}) & \text{otherwise.} \end{cases}$$

The interesting case, of course, is the one in which unemployment exists. So it exists, unemployment is an increasing function of the minimum wage rate. In this case

$$UE(\bar{w}_A) < UE(\bar{w}_B), \qquad \text{as long as } \bar{w}_A < \bar{w}_B,$$

i.e. at first sight the less cohesive society is bound to be worse off.

2.3 Inflation and Government Expenditures

In accordance with the situation in many economies entangled in the transition to market coordination, we now assume that the capability to raise tax revenues proper is exhausted. More precisely, we assume an output (income) tax rate which is fixed for both economies, at all output levels.[2]

The only other source of governmental revenue be its ability to print money, i.e. we allow for an inflation tax.

Unemployment is costly, its cost being contingent on the allowance for unemployment benefits. Unemployment related expenditures in both economies may differ, since both the level of unemployment as well as these benefit allowances may differ. In addition, the costs of unemployment may outweigh the regular tax revenues in either of the two economies, in which case the government will have to resort to inflationary financing. In general, the government is subject to the following budget constraint:

$$\tau Y + SE = \bar{b}UE, \tag{2}$$

where τ is the output tax rate and SE denotes seignorage, itself defined as

$$SE \stackrel{\text{def}}{=} \frac{\Delta M}{P} = \mu m,$$

where M is the nominal money supply, P the price level, μ the growth rate of nominal money, $\Delta M/M$, and m real money balances, M/P.

The rate of inflation resulting from monetizing the deficit is determined according to logic dictated by the quantity theory of money. For example, if the price level change (π) caused by the initial decline in output (with y designating the growth rate of output, $\Delta Y/Y$) and the associated rise in unemployment benefits reflects a completely monetized deficit, 'inflation' is expressed as the difference between the change in nominal money holdings and the change in real output

$$\pi = \mu - y \tag{3}$$

as long as the velocity of circulation is constant.[3]

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[2]It is tempting to allow for different tax rates as yet another measure of 'cohesiveness'. However, this would not qualitatively alter the results presented below. For reasons of simplicity, we therefore maintain the assumption of a single tax rate.

[3]From the quantity equation we get

$$\pi = \frac{\Delta M}{M} - \frac{\Delta Y}{Y} + \frac{\Delta V}{V},$$

with (ΔV) denoting the change in the velocity of circulation, and $k = 1/V$. Equation (3) is the simplest possible expression with k constant. Assuming k not to be constant would obviously alter the inflation rate without, however, providing the benefit of additional insight for our purposes.

Combining the budget constraint (2) with the quantity equation (3) in order to connect the change in the price level to the rate of unemployment and the fall in output, we finally get

$$\pi = \frac{\bar{b}UE - \tau Y}{kY} - y. \tag{4}$$

What happens next, however, depends on the inflow of new capital.

2.4 Investment

Foreign direct investment in practice is always subject to complex considerations. One observation which seems to be obvious from the data is that relative or unit labor costs bear no unique relation to foreign direct investment. More important are issues such as political stability, the protection of property rights (including the repatriation of profits), infrastructure in a broad sense (including human capital), and a host of other factors not readily reducible to the easy logic of short term profitability (cf. Krugman 1996). Broadly speaking, these factors can be categorized as related to the host country's infrastructure on the one hand, and its prospect of economic stability on the other.

In the case of economies in transition, where the terrain is unknown and conditions for economic stability are often viewed with suspicion, investors face the objective of profit maximization under an extremely high degree of uncertainty. Under these circumstances, the most obvious way of collecting information as efficiently as possible is to identify signals which can be taken as providing reliable proxies for the new environment and its economic prospects. One of the prime signals indicating the reliability of market reforms taking hold is the rate of inflation, as well as changes of that rate. More so than other indicators, inflation transmits a sense of the governmental ability to maintain control over an economy subject to the imposition of hard budget constraints. In our context, it becomes the best proxy for stability during the pursuit of effective reforms (Rühl and Vinogradov 1996).[4]

Moreover, most of the complex considerations determining foreign direct investment in reality, reduce to an identical set of parameters in the present model. If the determinants of foreign direct investment can be roughly subdivided into parameters signaling stability and infrastructure, respectively, than all those denoting infrastructure have to be the same, shall the assumption be maintained that both economies are structurally equal. We thus single out the rate of inflation as the most important signal transmitting the prospects of stability.

Foreign direct investment is a decreasing function of the rate of inflation:

$$FDI = FDI(\pi), \quad FDI'(\pi) \leq 0.$$

As a first and immediate implication it is not obvious any longer which of the two economies will be better off in response to a given shock.

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[4]In the present model, foreign capital inflows are the sole source of new capital. However, the role of inflation can be seen as equally significant in determining the decision of domestic investors, i.e. the choice leading to capital accumulation or capital flight, if allowance for domestic savings is made.

2.5 The Labor Market

Recall that the existence of a minimum wage may lead to unemployment, with all those employed working in the old sector at the minimum wage rate, while the unemployment rate depends on a standard labor supply function. This function reflects the preference ordering after the demise of socialism, i.e. it already incorporates the changed economic conditions.

Neglecting benefit payments to the unemployed (or assuming that they are low enough not to interfere), the new sector will now exercise additional demand for labor. Since agents in that sector are not tied to the minimum wage, employer's hiring decisions are contingent only on the sector's production function. At low levels of labor demand, that demand will be satisfied out of the pool of unemployed workers (so they exist), at wage rates below the minimum wage

Labor supply, on the other hand, becomes partly endogenous because it will vary in response to the initial rate of unemployment. The reason for this phenomenon lies with insiders holding on to privileges of the past: No one employed in the old sector will be available for work at a wage level below the minimum wage effective in that sector. In the presence of unemployment, the labor supply available for the new sector (at wages below $\bar{w}$) therefore has to be adjusted for those who would be willing to work at wage rates below $\bar{w}$ in principle, but need not signal this willingness because they are employed in the old sector. In general, the *lower* the rate of unemployment the larger that distortion: The more people are employed in the old sector (following the initial shock), the larger the decline in the effective labor supply for wages below the minimum wage.

One may reasonably well argue that this distortion lies at the heart of the great variance in labor participation rates observed in Eastern and Central Europe – especially in countries officially still close to full employment.[5]

However, it also seems reasonable to extend the argument and to claim that the effect is of general relevance, whenever large scale employment in one (commonly the public) sector is suddenly scaled down, or the relative size of two sectors suddenly varies, provided the wage rate in that sector exceeds that of the other (private) sector: As the public sector is scaled down, given the size of the private sector, the participation rate declines for those unwilling to register as unemployed, because they are not able or willing to work at the lower wages provided by the private sector. The higher the wage differential between both sectors, the larger this effect.

We account for labor supply being endogenous to this degree by allowing it to vary in response to the initial rate of unemployment. The negative effect on effective labor supply for wages below the minimum wage is measured by assuming that those working at wage levels higher than their reservation wage are distributed uniformly across the entire work force. We do not allow for labor supply to increase over and above the level of full employment attained under central planning. Levels of labor demand absorbing the full contingent of the unemployed at wages exactly equal to the minimum wage and levels of

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[5]The prime example in our sample would be the Czech Republic (see table 3). A similar case can be made for Estonia.

labor demand attracting additional labor from the old sector at wages higher than $\bar{w}$, will both bring the system back to the original labor supply curve.
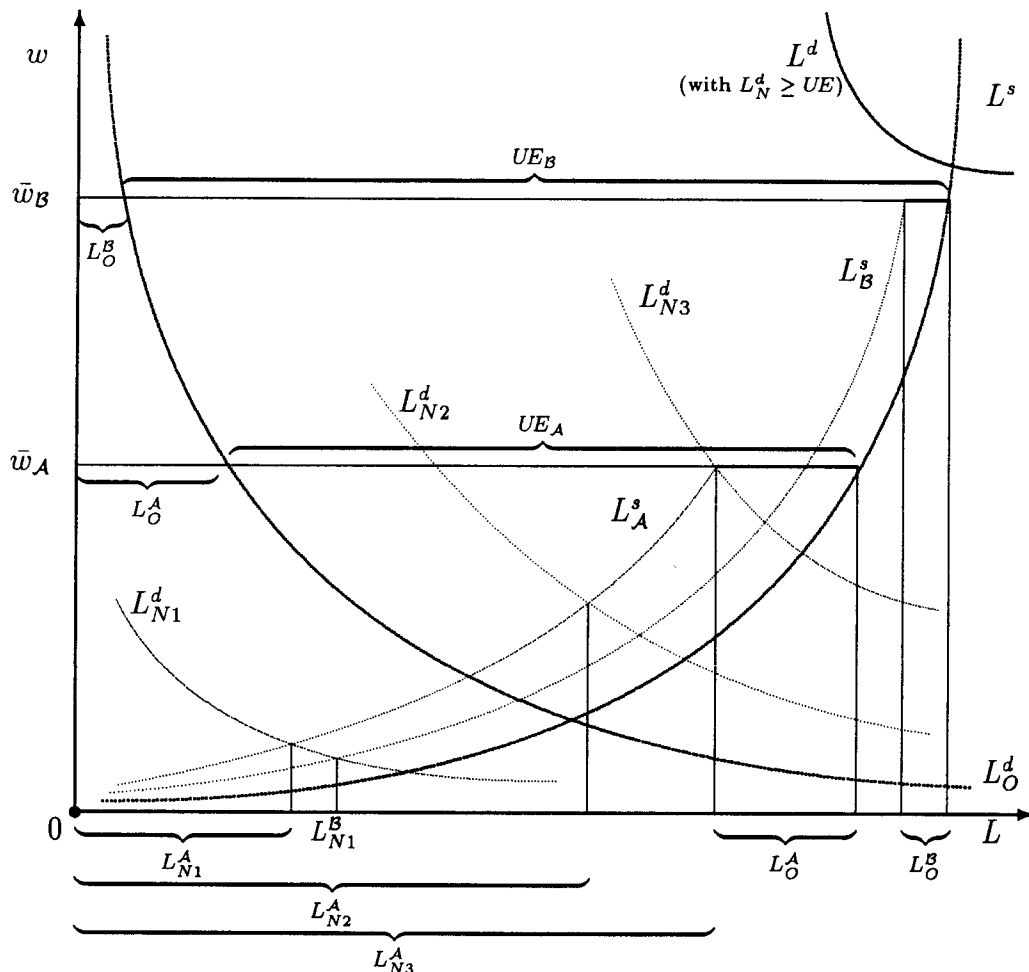

Fig.1. *The labor market.*

Figure 1 illustrates the mechanism. For the sake of convenience we contrast the impact of an identical shock under two minimum wage regimes and compare the effects of different degrees of labor demand exercised by the new sector. UE_B reflects the initial unemployment associated with $\bar{w}_B$ and UE_A the corresponding unemployment caused by the (lower) minimum wage, $\bar{w}_A$. Employment in the old sector is depicted as L_O^B and L_O^A, respectively. At wages below $\bar{w}$, the pool of the unemployed constitutes the sole source of labor for the new sector. L_A^s and L_B^s reflect the effective labor supply curves, assuming that those employed are drawn uniformly from the entire work force, if we re-scale the picture such as to depict the trade off between a minimum wage so high that some would work for less, and labor supply. The 'shift' of the supply functions represents the (lower) quantity of labor available at alternative wage rates, once those who would be willing to

work at these wage rates but are already employed at the minimum wage are subtracted. As the wage offers made in the new sector decline, the effectively available labor supply out of the 'pool' of the initially unemployed declines also.

In arithmetic terms, labor supply for all wages smaller or equal to the minimum wage $\bar{w}$ has to be multiplied by a coefficient measuring the effect of employment in the old sector:

$$\text{for all } w \le \bar{w} \quad L^s(w) = \frac{UE}{L^s(\bar{w})} L^s(w).$$

If the wage payments offered by the new sector equal the minimum wage, labor supply is identical to the number of unemployed.

Concentrating on economy $\mathcal{A}$, where the relevant pool is $UE_{\mathcal{A}}$, reveals the effects of different rates of capital inflow. L_N^d is the labor demand of the new sector.

L_{N1}^d, L_{N2}^d, L_{N3}^d denote alternative labor demand functions contingent on the production function of the new sector, at increasing levels of foreign direct investment. L_{N3}^d represents the case in which all those left unemployed by the initial shock find employment in the new sector, at the going minimum wage. Three effects are noteworthy:

– First, at any level of foreign direct investment larger than zero, the labor market clears. Unemployment understood as an 'involuntary" or disequilibrium phenomenon disappears because the labor market is in equilibrium. (Recall, however, that we assumed that social benefits do not interfere.)

– Second, participation rates in the aggregate fluctuate in two systematic ways: the lower the inflow of foreign direct investment, the lower the participation rate, due to the labor size in the new sector. Further, employment in the new sector will, ceteris paribus, be higher the higher the initial unemployment (given L_{N1}^d, for example, $L_N^{\mathcal{A}}$ will be smaller than $L_N^{\mathcal{B}}$, etc. for all levels of L_N^d).

– Third, if the labor demand exercised by the new sector is such as to exceed the supply at the minimum wage, it has to be satisfied by withdrawing labor from the old sector. In that case, there is no more need to distinguish two labor demand functions. (In our picture, L^d depicts the new aggregate labor demand function, comprised of $L_N^d + L_O^d$.)

2.6   The Question

We are now in a position to sketch the chain of events marking the reaction of a more and that of a less cohesive economy, if both are exposed to the same disturbance. In both cases, the size of the old capital stock express the degree of the initial shock. Let it be the same for both economies. Under these circumstances, both economies will differ (a) with respect to the amount of unemployment created by their respective minimum wage requirements; and (b) with respect to the inflation rate created by the budgetary need of catering to the unemployed. The less cohesive society will start out exhibiting higher unemployment, while the initial inflation differential between both economies depends on the size of the shock, and on the wage and the benefit differential between both economies. The inflow of foreign capital will vary accordingly.

In comparing the reaction of both economies, the appropriate measure for economic performance is per capita income. The final outcome depends on three considerations: It depends on the inflation rate, since inflation determines the level of foreign direct investment. It depends on initial unemployment, since unemployment determines the share of the total workforce employed at the new sector after the adjustment. And it depends on the labor productivity differential between the old and the new sector, since this differential influences per capita output in the aggregate, once the shares are established.

The productivities of the new and the old sector are given. Employment and the rate of inflation both depend on the minimum wage rate and the level of social benefit payments. These are the parameters denominating the degree of cohesiveness.

The question then becomes: Is there or is there not a systematic pattern in the way in which economies characterized by different degrees of cohesiveness respond to varying degrees of disturbances? And if success rates differ in a systematic way, what is the exact nature of that relationship?

3 The Model

3.1 Defining Isoinflation Curves

To answer, we formalize the response pattern of our hypothetical economy after the exogenous shock exposed it to a competitive environment. The only requirement we impose is that the shock is large enough to create inflation.

Let output under central planning be denoted by $\tilde{Y}$. Equation (4) can than be rewritten as

$$
\begin{aligned}
\pi &= \frac{\bar{b}UE - \tau Y}{kY} - \frac{Y - \tilde{Y}}{Y} \\
&= \frac{\bar{b}UE + k\tilde{Y}}{kF_O(L_O^d(\bar{w}), \bar{K}_O)} - \left(1 + \frac{\tau}{k}\right).
\end{aligned}
\tag{5}
$$

where Y denotes the initial output after the economy has been liberalized. $Y < \tilde{Y}$ after the onset of reforms, since parts of the capital stock ceased being viable. In addition, we assume that the degree of the shock (i.e. the decline of output) is 'substantial' in the sense that inflation is present even if unemployment is not:

$$
\left(1 + \frac{\tau}{k}\right) F_O(L_O^d(\bar{w}), \bar{K}_O) - \tilde{Y} < 0 \qquad \text{for all } \bar{w} \geq w^{eq}.
\tag{6}
$$

From equation (6) a lower bound of the inflation rate can be derived: It is the lowest inflation rate achievable, given the degree to which capital became obsolete, i.e. the magnitude of the initial shock. Note that this rate can be achieved only if the minimum

wage does not exceed the equilibrium wage clearing the labor market. The lower bound of the inflation rate therefore is associated with full employment at the old capital stock:

$$\pi \geq \hat{\pi},$$

where $\hat{\pi}$ is derived from

$$\left(1 + \frac{\tau}{k} + \hat{\pi}\right) F_O(L_O^d(w^{eq}), \bar{K}_O) - \tilde{Y} = 0.$$

Let us pause here for a moment to be clear about the implications. Using (5), we can single out the parameter $\bar{b}$ as follows:

$$\bar{b} = k \left(\left(1 + \frac{\tau}{k} + \pi\right) F_O(L_O^d(\bar{w}), \bar{K}_O) - \tilde{Y}\right) \frac{1}{L^s(\bar{w}) - L_O^d(\bar{w})}. \tag{7}$$

For the lowest possible inflation rate to be realized, the real wage w and therefore the minimum wage must not exceed the market clearing equilibrium wage guaranteeing full employment at the old capital stock. Since this lower bound of the inflation rate exist for any $\bar{b}$ once the size of the shock is given (and can be defined for an initial disturbance of any size), a range of $(\bar{b} - \bar{w})$ combinations exist which will minimize the inflationary impact resulting from a continuum of conceivable shocks. All are combinations at which $\bar{w}$ does not interfere with labor market clearing, given only the remaining old capital stock.

But of course, the minimum wage need not be set so conveniently. If, given $\bar{b}$, it exceeds the equilibrium wage rate, unemployment *and* inflation are the economy's response to the disturbance. As long as $\bar{b}$ remains constant, an increase of the minimum wage results in higher rates of inflation. In this case, a continuum of $(\bar{b} - \bar{w})$ combinations exists for any specified shock, for which the inflation rate will be the same: If the inflation rate is kept constant, given the size of the shock, $\bar{b}$ and $\bar{w}$ are inversely related (cf. equation (7)).

It is these cases, where unemployment is positive and the rate of inflation above its minimum level, which are most relevant to our question. At this point, we do not intend to complicate the analysis with the possible implications arising from a situation in which the unemployment benefits interfere with the adjustment mechanism of the labor market. For this reason, we exclude all situations in which $\bar{b} > \bar{w}$ from the analysis of the old sector. Further, we exclude the potential effects of benefit payments on wage setting in the new sector.[6]

Keeping in mind these restrictions, we have

Definition 2 *Given the size of the shock, we refer to all feasible $(\bar{b} - \bar{w})$ combinations generating an identical rate of inflation π (higher than or equal to $\hat{\pi}$) as an isoinflation curve in the $(\bar{b} - \bar{w})$ plane. An isoinflation curve is denoted by $\mathcal{I}(\pi)$.*

Figure 2 illustrates the definition.

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[6]Including the effect of unemployment benefits on the wages arising in the new sector does not qualitatively affect the results of the analysis.
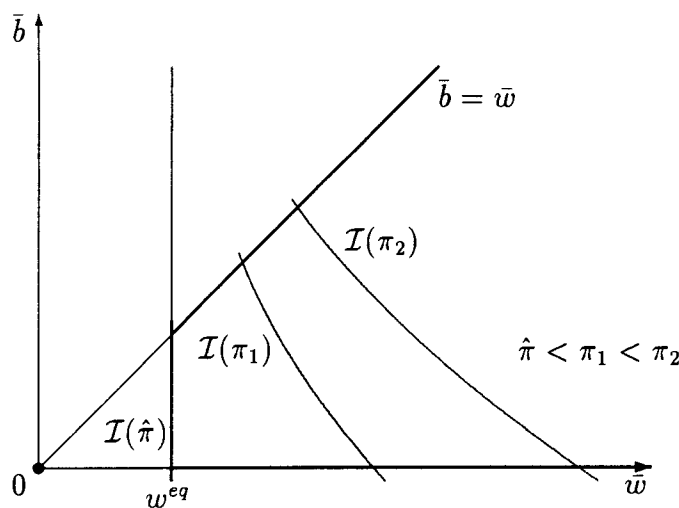
Fig.2. *"Isoinflation" curves.*

The 45 degree line in the $(\bar{b} - \bar{w})$ plane denotes situations in which unemployment benefits equal the minimum wage, leaving as cases of interest all points below that line $(\bar{w} \geq \bar{b})$. w^{eq} denotes the equilibrium wage, determined in the labor market given only the old capital stock, leaving as points of interest the segment to the right of that line, $\bar{w} \geq w^{eq}$. The plane thus delineated is the feasible set of $(\bar{b} - \bar{w})$ combinations. In it, $\hat{\pi}$, π_1, and π_2 denote three of the possible inflation rates with which the system corresponds to any one shock of a given magnitude (and the associated labor market clearing wage w^{eq}), contingent on the way in which the parameter combination $(\bar{b} - \bar{w})$ is set. Note the intuitively convincing implication that either higher minimum wage requirements or higher unemployment benefits (or both) will result in a higher inflation rate.

It follows that the two parameters $\bar{b}$ and $\bar{w}$ are inversely related for the same inflation rate: If one is increased the other will fall, shall the inflation rate stay constant, leading them to be shaped like the ones depicted in figure 2.

We thus arrive at

Proposition 1 *For any degree of shock, given an inflation rate $\pi > \hat{\pi}$, the associated isoinflation curve is downward sloping[7] and is of finite length in the feasible domain.*

See appendix for proof of proposition 1.

In a completely analogous way 'iso-output curves' can be established. For a shock of any given magnitude they would denote $(\bar{b} - \bar{w})$ combinations generating the same level of aggregate output.

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[7] $\pi = \hat{\pi}$ is the special case which corresponds to a vertical isoinflation curve.

15

3.2 Maximizing Output

From what has been said so far, it follows that for any given magnitude of the initial loss in capital, an inflation rate can be identified which represents alternative $(\bar{b} - \bar{w})$ combinations. Along this isoinflation curve output levels differ. Recall also that, using the terminology introduced earlier, movements along one isoinflation curve represent different degrees of 'cohesiveness', represented by the $(\bar{b} - \bar{w})$ combinations.

To make possible a comparison of the response of different economies to shocks of different magnitudes, the next step is to establish the maximum output level possible at any given inflation rate.

If we move along one isoinflation curve, the inflation rate remains fixed and foreign capital inflows therefore will be constant. If labor demand created by the new capital inflows is such that unemployment is completely absorbed and labor has to be bid away from its employment at the old capital stock, all differences between economies with different degrees of cohesiveness disappear. In this case, the wage rate is higher than the minimum wage. It is determined by aggregate labor demand, i.e. by a labor demand function such as L^d in figure 1.

Certainly, this 'best of all worlds' is not the only conceivable case. In what follows we concentrate on situations where foreign capital inflows are small, so that they clear the labor market (with labor supply constituted by the unemployed dismissed from the old sector), at a wage rate lower than the minimum wage.

Aggregate output equals

$$Y = F_O(L_O^d(\bar{w}), \bar{K}_O) + F_N(L_N(\bar{w}), FDI(\pi)).$$

We assume that the second derivative of Y with respect to $\bar{w}$ is negative. For the cases of interest, i.e. as long as the new capital stock K_N is small enough to allow for a market clearing real wage below the minimum wage set in the old sector, we can then advance

Proposition 2 *For each isoinflation curve exists a unique $(\bar{b} - \bar{w})$ combination at which aggregate output is maximized.*

See appendix for proof of proposition 2.

In order to keep the analysis tractable, we simplify the investment function further, and proceed by specifying a stepwise function relating foreign direct investment to the rate of inflation:

$$FDI(\pi) = \begin{cases} \bar{K}_N, & \pi \leq \pi^* \quad (\text{assuming } \pi^* > \hat{\pi}), \\ 0, & \text{otherwise.} \end{cases} \tag{8}$$

In addition, we assume a productivity distribution such that the decline of output in the old sector is more than compensated for by the output increase in the new sector, after unemployment has been absorbed there:

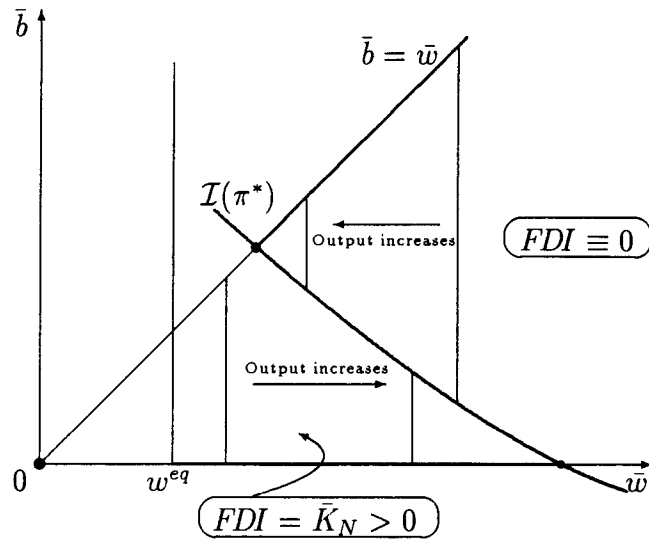$$\frac{F'_{N_L}}{F'_{O_L}} > -\frac{L'_{O_{\bar{w}}}}{L'_{N_{\bar{w}}}}. \tag{9}$$

16

Fig.3. *Output maximization:*
the case of a stepwise FDI function.

Figure 3 illustrates the relationship between maximum output and isoinflation curves by incorporating the stepwise function for foreign direct investment. $\mathcal{I}(\pi^*)$ denotes the isoinflation curve at which investment switches: Above $\mathcal{I}(\pi^*)$ inflation is at a level at which no foreign capital is attracted, below $\mathcal{I}(\pi^*)$ a fixed amount of capital inflows takes place. Again, w^{eq} denotes the wage at which the labor market clears with full employment in the old sector, given the size of the initial shock. Output increases with increasing $\bar{w}$ levels below the isoinfltion curve, where higher real wages express higher employment in the new sector as more labor is released by the old sector. It decreases with increasing $\bar{w}$ above the isoinflation curve, where foreign capital inflows are zero and increasing minimum wage levels have to be equal to the marginal productivity of labor in the old sector, i.e. denote a decrease in the size and employment of that sector.

The response of the economy to shocks of any magnitude depends on the capability to cushion these shocks by choosing the degree of inflationary financing. 'Too much' inflation has negative consequences for foreign direct investment, in which case high minimum wages translate into a relatively smaller portion of the old capital stock remaining viable, with output falling as wages increase. 'Less' inflation leads to foreign capital inflows, in which case high minimum wages indicate the productivity of a larger part of the workforce now employed in the new sector, with output increasing as wages go up, because labor is released by the old sector.

It thus becomes possible to compare economies with different parameter constellations for $\bar{b}$ and $\bar{w}$ with respect to their response to shocks of different magnitude.

3.3 The Comparison

To do so we adopt the standard criterion of output per capita to measure economic performance. It translates into aggregate output since we do not discuss population growth.[8]

We distinguish two economies. Their only difference is the degree of cohesiveness, as previously defined: One of them has a higher minimum wage requirement and it offers lower unemployment benefits than the other.

We denote as $\mathcal{A} \succ \mathcal{B}$ a higher level of output (per capita) of economy $\mathcal{A}$, compared to economy $\mathcal{B}$. At issue is their response to shocks of different magnitudes.

First the relative position of the more and the less cohesive society can be delineated, using the same framework as before. Let $\mathcal{A}$ in figure 4 represent the cohesive society. Economies within the rectangle confined below $\bar{b}_A$ and to the right of $\bar{w}_A$ fall into the relatively less cohesive category. Note, that the inflation rate of less cohesive economies, given the magnitude of the shock, may be higher or lower than that of $\mathcal{A}$ (i.e. to the right or to the left of $\mathcal{A}$'s isoinflation curve), contingent on the parameter constellation.
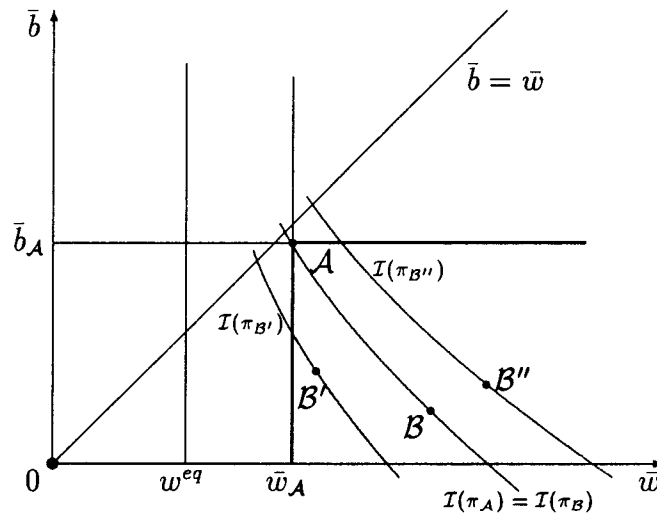

Fig.4. *Possible relative locations of $\mathcal{A}$ and $\mathcal{B}$.*

The isoinflation curve π^* in Figure 5 denotes the threshold at which the inflation rate separates the two investment regimes. Its relative position is determined by the magnitude of the exogenous shock: The larger the shock, the more toward the origin will the isoinflation curve π^* shift, reflecting the inflationary impact as, *at given* $(\bar{b} - \bar{w})$ *combinations*, increasing parts of the old capital stock become non-viable. The inflation rate π^* and therefore the impact on foreign direct investment remain the same as the

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[8]The analysis could obviously be conducted also in terms of output per worker, so this decision is merely a matter of taste.

economy is exposed to shocks of different magnitudes. However, the relative position of the isoinflation curves has to change: the threshold rate moves to the left with increasing magnitudes of initial disturbances. Figure 5 indicates how identical $(\bar{b} - \bar{w})$ combinations change the configuration of the isoinflation curves, leading the threshold inflation rate to be located first closer to the isoinflation curves of $\mathcal{A}$ and $\mathcal{B}$, until it passes them and moves away toward the other side, as the shock increases.[9]

Obviously, the same mechanism must be true for all isoinflation rates. Consider figure 5 and let $\mathcal{A}$ and $\mathcal{B}$ denote more and less cohesive societies, as previously defined. π^* is the inflation rate at which foreign direct investment ceases to respond. As the magnitude of the shock increases (i.e. $\bar{K}_O$ declines, with $\bar{K}_O'' < \bar{K}_O'$), the set of economies moves closer together, and they shift to the left, expressing the increase in inflation rates brought about by increasing the magnitude of the initial loss of capital, while the $(\bar{b} - \bar{w})$ combinations are kept constant. Panel b illustrates the result.
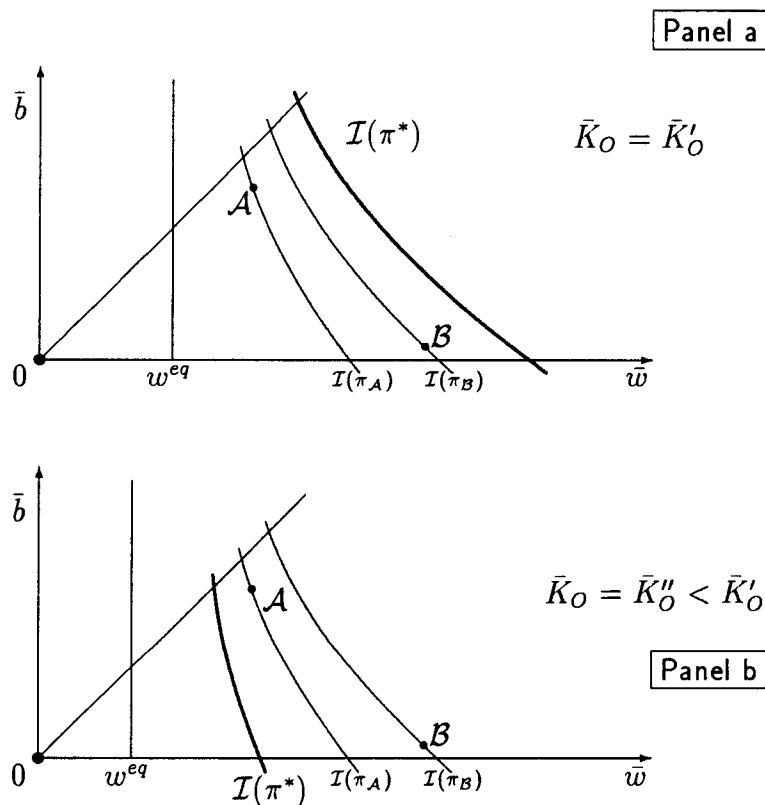

Fig.5. *Response patterns of $\mathcal{A}$ and $\mathcal{B}$ to variations in the magnitude of the initial disturbance.*

We are now in a position to address the question of how the more and the less cohesive

economy will react in response to shocks of different magnitudes. Three cases can be distinguished.

(i) If $\mathcal{A}$ and $\mathcal{B}$ are both to the left of π^*, i.e. if the inflation rate created by the initial shock is lower than the threshold inflation at which foreign direct investment ceases, the less cohesive society $\mathcal{B}$ will be better off. Both economies receive the same amount of foreign direct investment, but the less cohesive society creates more unemployment. Consequently, more people will be employed in the more productive new sector, at wages below the minimum wage rate.

This situation corresponds to small shocks.

(ii) If $\mathcal{A}$ and $\mathcal{B}$ are both to the right of π^*, i.e. if the inflation rate created by the initial shock is higher than the threshold inflation, the less cohesive society $\mathcal{B}$ will be worse off. Both economies receive no foreign direct investment, and the unemployment created by the less cohesive society is larger. Consequently, less people will be employed in the old sector, at the minimum wage rate.

This situation corresponds to large shocks.

(iii) For medium level shocks, two scenarios are conceivable.

$\mathcal{A}$ could be to the left of the inflation threshold and $\mathcal{B}$ to the right, or vice versa. In both instances, the economy to the right of π^* is worse off. The reason relates to the two possibilities depicted in figure 4: Suppose the more cohesive society $\mathcal{A}$ has, after the initial shock, not reached the critical level of inflation. It will attract foreign direct investment which compensates for the unemployed, while economy $\mathcal{B}$ will not. The reverse holds true if $\mathcal{B}$ happens to be associated with the lower initial rate of inflation.

In general, the larger the difference in inflation rates between both economies, the larger the difference in aggregate output. Also, the larger the decline in employment resulting from the initial loss of capital, the lower the participation rate of labor at which full employment can be restored in the new sector.

Results (i) through (iii) can be summarized as follows:

Proposition 3 *If economy $\mathcal{A}$ is more cohesive than economy $\mathcal{B}$, then*
(i) $\hat{\pi} < \pi_A, \pi_B \leq \pi^* \Longrightarrow \mathcal{B} \succ \mathcal{A}$;
(ii) $\pi_A, \pi_B > \pi^* \Longrightarrow \mathcal{A} \succ \mathcal{B}$;
(iii) $\hat{\pi} < \pi_A \leq \pi^* < \pi_B \Longrightarrow \mathcal{A} \succ \mathcal{B}$;
$\hat{\pi} < \pi_B \leq \pi^* < \pi_A \Longrightarrow \mathcal{B} \succ \mathcal{A}$.

See appendix for proof of proposition 3.

4   Conclusion

It certainly would be going too far to pretend that the foregoing analysis leads itself to empirical validation easily. The data situation with respect to the desirable variables is treacherous. Cross country comparisons have to be adjusted such as to take account of countries' relative initial position. And most importantly, real world processes take place over time while our model is set in a comparative static framework.

Of course, this does not preclude one to scan the literature for hints as to the extent to which social cohesion appears relevant to understanding differences in cross country performance (or for why the idea appealed to the authors). Any such attempt has to be limited as much as possible to economies in a comparable situation. We chose 7 central European economies out of the group of transition economies depicted in table 1.[10] Keeping in mind the caveats just made, the cumulative decline in output constitutes the most adequate measure of the size of the shock. If we set the threshold somewhat arbitrarily at 20 percent, Bulgaria, the Czech Republic, Romania and Estonia can be considered as subject to a 'large' shock, whereas Poland, Slovenia and Hungary qualify as examples of (relatively) 'small' shocks.

According to the hypothesis discussed in the text, more cohesive societies should as a role of thumb – i.e. focusing on the wage differential between both groups and assuming that, at the onset of the transition, wage differences between them are more pronounced than differences in welfare payments – generate less of an inflationary response to given shocks than less cohesive societies. Following this rather crude standard (and perhaps displaying a degree of author's prejudice) the Czech Republic, Estonia (taking account of the fact that the ruble inflation was outside the scope of its influence) and Hungary appear to be the more cohesive societies in our sample, if table 1 is any guide.[11] In terms of the chosen subset, the following grouping would result:

	small shock	large shock
cohesive	Hungary	Czech Republic, Estonia
less cohesive	Slovenia, Poland	Bulgaria, Romania

Table 2. *Grouping of seven Central European economies.*

Table 3 provides a closer look at the economies in question. That all of them exhibit positive growth rates and that high inflation has more or less disappeared adds to the homogeneity of the selection. The growth rates of per capita income after are the most appropriate measure for a successful adaptation to the initial shock.[12] With the arguable exception of Hungary and Romania, table 3 appears to confirm the initial impression.

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[10]Left out of the group of central European economies are Albania, because both, its history as well as its per-capita income prior to the transition (USD 1386 at PPP) identifies it as an outlay; economies torn by ethnic strife or civil war such as Croatia or Moldavia; and two Baltic countries because of the unreliable data situation.

[11]Note that the inflationary impact is measured in table 1 as a cumulative price change.

[12]Since these growth rates appear highly correlated to the initial decline in output, they have to be adjusted for this influence, if taken cumulatively.

Country	GNP/Capita at PPP (USD, 1988)[a]	Cumulative output decline and year output was lowest (1989=100)[a]	Cumulative decline in employment (1989-1993) [and 1989-95][c]	Officially registered rate of un-employment (1993)[d]	Annual rate of inflation, geometric average (1989- year in which output was lowest), (year in which output was lowest-1995), and (1989-1995)[e]		
Czech Rep.	8669[b]	21.4 (1993)	11.6 (26.8)	3.5	19	9.3	16.1
Estonia	9078	34.9 (1993)	NA	2.6	145.8[h]	34.6	106.9
Hungary	6569	18.3 (1993)	28.5 (35.7)[f]	12.1	25	23.7	24.6
Bulgaria	5968	27.4 (1993)	35.5 (NA)	16.4	77.5	75.5	77.0
Romania	3722	26.4 (1992)	8.3 (NA)	10.2	73.5	121.6	92.7
Poland	4941	17.8 (1991)	16.8 (17.6)[g]	15.6	244.8	32.7	99.8
Slovenia	10663	16.8 (1992)	18.6 (20.6)	14.5	394.6[i]	20.7	170.2

Panel b.

Country	Average annual deflated wage index(1987=100), (1989-91) and (1992-93)[j]		Monthly wages/GDP per capita at PPP (USD, 1993)[l]	Cumulative FDI per capita (USD, 1990-1993)[m]	Cumulative GDP growth (year output was lowest -1995)[n]	GDP growth 1995[n]
Czech Rep.	90.4	64.5	0.031	167	3.7	4.8
Estonia	NA		0.017	113	5.5	6.0
Hungary	99.6	94.2	0.057	528	2.5	2.0
Bulgaria	95.2	81.3	0.023	19	2.0	2.6
Romania	98.5	68.8	0.030	6	4.1	6.9
Poland	101.9	88.3	0.038	22	4.5	6.5
Slovenia	NA[k]		0.046	138	3.8	4.8

[a] Fischer, Sahay, Vegh 1996, Stabilization and Growth in Transition Economies: The Early Experience, Journal of Economic Perspectives, No. 2.
[b] Own calculations, based on EBRD 1994, Transition report.
[c] EBRD 1995, Transition report update; IMF 1996, International Financial Statistics.
[d] EBRD (1995). Unemployment was highest in 1993, except for the Czech Republic (4.1% in 1991), Hungary (12.3% in 1992) and Romania (10.9% in 1994).
[e] De Melo, Denizer, Gelb 1996, From Plan to Market. Patterns of Transition, The World Bank, Policy Research Working Paper 1564; IMF 1996; Economist Intelligence Unit 1996, Country Reports.
[f] 1989-1994.
[g] Poland is the only country in the sample where registered employment in increased again (industrial employment up 0.7% in 1995).
[h] Ruble inflation. Estonia introduced its own currency in 1992.
[i] Dinar inflation. Slovenia introduced its own currency in 1992.
[j] De Melo, Denizer, Gelb (1996). 1993 is estimate.
[k] Average real wage percentage change, 1992-95, is 6.6% (IMF 1996).
[l] Own calculations, based on EBRD (1994, 1995).
[m] EBRD (1994).
[n] Economist Intelligence Unit (1996), IMF (1996). Estonia is estimate (EBRD 1995).

Table 3. *Macroeconomic indicators for seven central European countries.*

This holds true in particular for the Czech Republic and Estonia and their less cohesive analogues Poland and Slovenia; but also, with some reservations, for Bulgaria. Concentrating on the first four yields examples of successful adjustment. Both, the Czech Republic and Estonia were subject to a high level shock, while the cumulative output decline in Poland and Slovenia was somewhat less severe. From that point onwards, they behaved much as predicted: The cohesive societies had lower wages, generated much less unemployment, and a lower rate of inflation.[13]

The inflation rate differentials across the whole group, including Hungary and Romania, is of particular interest. It serves as a reminder of what has been discussed by means of figure 4: The rate of inflation with which countries may respond to an initial disturbance of the same magnitude differs for alternative $\bar{w} - \bar{b}$ configurations; since a less cohesive society, in response to the same shock, can exhibit higher as well as lower inflation rates than a cohesive one, inflation in and by itself ought to be used as an indicator of cohesiveness only with much caution. Overall, the Czech Republic and Estonia on the one hand and Poland and Slovenia on the other appear to fit well the general hypothesis according to which less cohesive societies would be able to cope better with low level, and more cohesive societies to cope better with high level disturbances. With reservations that remains true also for Bulgaria.

Note also that the first four countries seem to indicate a stable pattern of recovery: their latest output growth rate is above the average for the years since output was lowest (including that latest year), indicating a strong tendency to maintain performance patterns suggested by the J-curve, i.e. an acceleration of growth rates after the 'valley of tears' has been crossed.

Hungary and to a lesser extent Romania almost escape the initial classification of table 2. In terms of the important parameters, especially the wage indicator, Hungary seems much more of a candidate for a less cohesive society than indicated earlier. The main difference to other economies is the tremendous inflow of foreign direct investment Hungary enjoyed – a reminder of the role of time since this effect is undoubtedly rooted in Hungary's specific history of early reforms. That we may have observed a passing effect, to venture a hypothesis, corrected over time as the less cohesive formation of the economy became apparent might be indicated by the fact that not all indicators are jubilant: Hungary is the only country in the sample where the most recent growth rate has slowed down, compared to the average since output was lowest.

Romania, on the other hand, appears to be more cohesive than indicated earlier, if one looks at the important parameters; yet again, just as in Hungary (though in the opposite direction) there appears to be a lag in the adjustment, specifically of wages, which might explain its response pattern simply as a very slow process of adaptation. Consequently, the country suffers from the reverse Hungarian syndrome also in another, and more important respect: Foreign direct investment has been extremely low, and there does not seem much betterment in sight. Aside from emphasizing once more the role of capital inflows as the engine of growth in transition economies, the Romanian example provides still another

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[13]Inflation rates have to be adjusted for the initial Ruble and Dinar inflation, not subject to the control of the respective later governments.

peculiarity. It arises from the observation that its most recent output growth rates are higher than the average over the years since output was lowest. The belated downward flexibility of wages resulted in re-gaining parts of the capital stock which were lost as part of the economy's initial response to the shock, emphasizing that parts of the old capital stock can indeed be revived in reality, provided wages accommodate such an attempt. This effect has been explicitly excluded from our model.[14]

Again, we have to caution that this very preliminary and crude empirical example can not be taken as validating the argument. The quality of the data, in particular on the decisive distributional variables, does not allow for strong conclusions, aside from the methodological caveats mentioned earlier. In addition to these caveats, the parameter constellations investigated in our model may generate the predicted outcome in reality, without any necessary bearing on the question whether the parameters do reflect a halfway accurate measure of the 'degree of cohesiveness', or whether they just mirror pedestrian mechanisms of economies in distress. But certainly, the preliminary data do not falsify the idea either. Overall, this points to a familiar conclusion: more research is needed on this topic. The preliminary results suggest that it is warranted, too.

Appendix

Proof of Proposition 1.
Calculating the first derivative with respect to $\bar{w}$ yields

$$\bar{b}'_{\bar{w}} = \frac{C_1 F'_{O_w}(L^d_O(\bar{w}), \bar{K}_O)}{UE} - \left(C_1 F_O(L^d_O(\bar{w}), \bar{K}_O) - C_2\right) \frac{UE'_{\bar{w}}}{UE},$$

where

$$C_1 = k\left(1 + \frac{\tau}{k} + \pi\right),$$
$$C_2 = k\tilde{Y},$$
$$C_1 F_O(L^d_O(\bar{w}), \bar{K}_O) - C_2 > 0.$$

Recall that

$$L^{s\prime}(\bar{w}) > 0, \quad L^{d\prime}_O(\bar{w}) < 0, \quad UE'(\bar{w}) = L^{s\prime}(\bar{w}) - L^{d\prime}(\bar{w}) > 0,$$
$$F'_{O_w} = F'_{O_L} L^{d\prime}_O = \bar{w}L^{d\prime}_O < 0.$$

Therefore $\bar{b}'_{\bar{w}} < 0.$

Moreover, an isoinflation curve (given the inflation rate) crosses the $0 - \bar{w}$ axis at $\tilde{w}$, such that

$$\left(1 + \frac{\tau}{k} + \pi\right) F_O(L^d_O(\tilde{w}), \bar{K}_O) - \tilde{Y} = 0,$$

and $\bar{b}$ remains negative for all $\bar{w} > \tilde{w}$.

$\square$

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[14]There is, however, nothing in the model which would preclude an extension to capture that effect

Proof of Proposition 2.

The maximization problem is

$$max_{\bar{w}}Y = F_O(L_O^d(\bar{w}), \bar{K}_O) + F_N(L_N(\bar{w}), FDI(\pi))$$

$$\text{s.t. } \bar{b} = k\left(\left(1 + \frac{\tau}{k} + \pi\right) F_O(L_O^d(\bar{w}), \bar{K}_O) - \tilde{Y}\right) \frac{1}{L^s(\bar{w}) - L_O^d(\bar{w})},$$

$$(\bar{b}, \bar{w}) \in \text{ feasible set.}$$

$FDI(\pi)$ remains constant along any isoinflation curve, and therefore does not affect the solution of the maximization problem.

The second derivative of output with respect to the minimum wage rate is negative. Hence, output as a function of the minimum wage reaches its maximum on the closed interval of the values of the argument, and this maximum is uniquely defined. The corresponding value of the benefit payment is defined by equation (7).
□

Proof of Proposition 3.

Given the function for foreign direct investment (8), the value of output is

$$Y = \begin{cases} F_O(L_O^d(\bar{w}), \bar{K}_O) + F_N(L_N(\bar{w}), \bar{K}_N), & \text{if } \pi \le \pi^*, \\ F_O(L_O^d(\bar{w}), \bar{K}_O), & \text{otherwise.} \end{cases}$$

In order to prove that output is changing monotonously along the isoinflation curve, let us calculate the first derivative of Y with respect to the minimum wage.

Since employment in the new sector is an increasing function of unemployment in the old sector,

$$L'_{N_{\bar{w}}} = L'_{N_{\bar{w}}}(UE(\bar{w})) = L'_{N_{UE}}UE'_{\bar{w}} > 0.$$

Maintaining assumption (9) we get

$$Y'_w|_{\text{along } \mathcal{I}(\pi)} = \begin{cases} L^{d\prime}_O F'_{O_L} + L'_N F'_{N_L} > 0, & \text{if } \pi \le \pi^*, \\ L^{d\prime}_O F'_{O_L} < 0, & \text{otherwise.} \end{cases}$$

Technically speaking, we have corner solutions: Below π^* output increases along any isoinflation curve with an increase in the minimum wage; above π^* it decreases with an increase in the minimum wage. It follows that maximum output along any isoinflation curve corresponds to the highest possible unemployment level below the π^* threshold, and to the lowest possible unemployment above that threshold.
□

References

[1] Azariadis, C., 1996, The Economics of Poverty Traps, Journal of Economic Growth, Vol. 1, No. 2.

[2] Fischer S. and Gelb A., (1991), The Process of Socialist Transformation, Journal of Economic Perspectives, Vol. 5, No. 4.

[3] Krugman P. (1996), The Self-Organizing Economy, Cambridge (Mas.), Oxford: Blackwell Publishers.

[4] Lindbeck A. and Snower D., 1988, The Insider Outsider Theory of Employment and Unemployment, Cambridge (Mas.) et al.: The MIT Press.

[5] Lipton D. and Sachs J., 1990, Creating a Market Economy in Eastern Europe: The Case of Poland, Brooking Papers of Economic Activity, No.1.

[6] Rühl C., 1996, Complex Economic Systems, East of Sweden, D. Heyman, K. Velupillai (eds.), Inflation, Institutions and Information. Festschrift for Axel Leijonhufvud, Oxford et al.: OUP.

[7] Rühl C. and Vinogradov V., (1996), The Blind Man's Subsidies. Output, Inflation and Employment in Transition Economies, Institute for Advanced Studies, East European Series, No. 35, and UCLA, Department of Economics, Center for Computable Economics Working Paper No. 33.

[8] Weitzman (1993), Economic Transition: Can Economic Theory Help?, European Economic Review, Vol. 37, No. 2/3.