

A Microeconomic Explanation for the Macroeconomic Effects of Inter-Enterprise Arrears in Post-Soviet Economies

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1. Introduction

The early reform measures in the former Soviet Union (FSU), i.e. the abolishment of the central plan, destatification, price liberalisation and the removal of subsidies to state-owned enterprises (SOE), were followed by extreme economic disruptions. Neither experts nor politicians had expected the decline of output and the increase in the inflation rate to be so sharp and persistent. In addition, another feature emerged, known only to transition economies: an increase of involuntary inter-enterprise credit of truly epic proportions.¹⁾ The large amounts of trade credit had no chance to be recovered so that they effectively became arrears. Only six months after price liberalisation inter-enterprise arrears were up to three billion rubles in Russia, which constituted 150% of broad money.²⁾ The real increase of inter-enterprise arrears was stopped after July 1992, but the nominal increase continues until today, nearly five years after the early reforms. The same problem arose in other former Soviet republics too. For example in Kazakstan, the nominal as well as the real increase of inter-enterprise arrears continue until today.

The central characteristic of the emergence of inter-enterprise arrears is that a microeconomic problem, i.e. the illiquidity of a firm, becomes effectively a macroeconomic problem. The lack of individual finance of many firms leads to nation-wide internal indebtedness that cannot be ignored at the macro-level: first, because it is the symptom of an ill-functioning economy, and second, because it is supposed to have repercussions on other macroeconomic aggregates. Especially the impact of arrears on inflation is a central issue in the economic analysis surrounding arrears.

Daianu stated that arrears can be seen as temporary quasi-inside money fuelling inflation.³⁾ Clifton and Khan found empirical evidence for this and advised statisticians to add inter-enterprise arrears to broad money in order to judge its effects on inflation.⁴⁾ The direct relationship of trade credit and prices is clear: higher prices will cause higher trade credit to the client. However, this process will

¹⁾ Although in market economies, high levels of trade credit can also be observed, this feature is very different from the case of transition economies in that it is not involuntary but a regular means of co-operation between clients and suppliers.

²⁾ See Granville (1995).

³⁾ See Daianu (1994), p. 2.

⁴⁾ See Clifton/Khan (1993), p. 687.

have to come to an end on the consumer market, where consumers are subject to a cash-in-advance constraint. There will just not be enough money to pay the high prices, so that market forces will cause prices to fall. In the long run, inflation has to be money driven: "Inside money ... cannot be inflationary."⁵⁾

Exactly the opposite view about the relationship of inflation and inter-enterprise arrears is put forward by Calvo and Coricelli.⁶⁾ They argued that in an environment with underdeveloped financial markets the "credit crunch", i.e. a reduction in real credit by the high inflation at the beginning of price liberalisation, leads firms to compensate the lack of liquidity by falling into arrears to suppliers. Alfanderi and Schaffer have found evidence for a tight inverse relationship of inflation and rising inter-enterprise arrears.⁷⁾ They offer the explanation that both developments are driven by illiquidity caused by monetary restraint. Indeed, from the theory of trade credit we know that even firms in market economies prefer to extend trade credit rather than lowering prices in case of monetary restraint.⁸⁾

The microeconomic cause for arrears seems simple: the firm falling into arrears has not enough money. Some people argue that the firm's "working capital has been wiped out" by the high inflation. Can this be a valid explanation on the macroeconomic level too? Can there be a "lack of money in the whole economy"?⁹⁾ In the short run, a lack of liquidity leads to lower sales and therefore to an accumulation of stocks and arrears as not enough money is received. Following economic theory¹⁰⁾ a lack of money will result in a reduction of either prices or output or both in the long run. Arrears cannot increase in the long run when no additional liquidity is injected; real arrears cannot rise forever.¹¹⁾ It becomes clear that a purely macroeconomic explanation of the inter-relationship of inflation and arrears soon comes to an end, because it cannot explain the causes of the continuing build-up of arrears. The reasons will therefore have to be found on the microeconomic level.

We have come to admit that the obvious cause for arrears is an individual lack of money. As firms want to continue production, they fall into arrears to suppliers waiting for receipts to incur. The supplier will for his part be reluctant to demand immediate payment if he has no alternative way to sell his production. This will create a chain of arrears, because the supplier, not receiving any money, will not be able to pay its own supplier either and so forth. However, a production chain always has two ends: one at the consumer level, where cash money is received in exchange, and at the raw material level, where the bulk of the costs are wages, which have to be paid in cash. The question arising is: what is happening in the economy when cash received at the consumer level does not arrive at the raw material or upstream level? We must conclude that the incentives in the economy are such that there are

⁵⁾ See Condon/Ramachandran (1995), p. 26.

⁶⁾ See Calvo/Coricelli (1993), p. 36f.

⁷⁾ See Alfanderi/Schaffer (1996), p. 13.

⁸⁾ See Meltzer (1960), p. 436.

⁹⁾ For the argument of the lack of monetary resources in the whole economy, see various internal reports prepared on demand of the Ifo Institute, Munich, by the Institute of Economic and Market Relations under the Economics Ministry of the Republic of Kazakstan.

¹⁰⁾ See the monetarist Fisher equation.

¹¹⁾ I would like to thank Mark E. Schaffer for pointing out this fact to me while commenting on an earlier outline of this paper.

more efficient uses of cash than paying suppliers. Therefore, in order to analyse the impact of arrears on macroeconomic aggregates, we have to look at the microeconomic incentives developing in the post-Soviet economy. Only thereafter can we try to find the link between arrears and inflation and output. We will then be able to analyse the impact of specific policy measures on arrears and on macroeconomic aggregates.

To pursue this aim, it is necessary to design a simplified macro-model which will point to the structure of the Soviet economy and the conditions that prevailed at the outset of reform (chapter 2). As subsidised prices were financed by the state bank through monetary expansion a monetary overhang developed. It is important to understand that the initial reform steps, i.e. the loosening of state control through destatisation and price liberalisation, became the starting point, although not the cause, of the developing money machine.

As a second step (chapter 3) a microeconomic decision-making model of the enterprise in the transition period will have to explain how arrears accumulate in an industry along the technological chain. The production chain is highly monopolised and separated into three firms: upstream, intermediate and downstream. Managers have to stay on co-operative terms with their workers, which requires that minimum or tariff wages are paid promptly and inflation is compensated for by wage increases. Firms have considerable market power and can impose high prices, but on the consumer level they are restrained by effective demand arising from wages. As the costs of falling into arrears are assumed to be lower than the costs of making cash payments, we will see the accumulation of arrears.

The results of the microeconomic optimising behaviour will then have to be aggregated and included in the macroeconomic model to study the inter-relationship between inflation and arrears (chapter 4). The model can then serve to explain the impact of different macroeconomic policy measures on nominal and real aggregates (chapter 5). As it becomes immediately clear that microeconomic incentives cannot effectively be changed by macroeconomic policy, we will outline different reform packages that aim at influencing behaviour on the micro-level (chapter 6). Chapter 7 will recapitulate the conclusions.

2. A Stylised Model of the Soviet Economy

2.1 Basic Assumptions

The Soviet economy was designed to produce a maximum of goods at minimal costs. Assuming economies of scale in production, this can be achieved by building large monopolies - so-called combines - being almost the only producers of a particular product in the sector.¹²⁾ Combines under central planning did not behave

¹²⁾ Even if the Soviet economy as a whole had several firms for the production of the same good, one could imagine them being local monopolies. Transport costs are high due to long distances and missing transportation routes (see for example Huber/Schönherr/Thanner (1992) and Huber/Schönherr/Thanner (1993)). Furthermore the establishment of personal ties between managers and missing marketing expertise are additional reasons why firms fall back upon long-standing supply structures.

like profit-maximisers but were controlled by state ministries in order to achieve the plan and to cover, if possible, production costs with revenues. Therefore one would not expect the combines to behave like monopolists in a market economy, which raise marginal returns above marginal costs by lowering output and employment, thereby diminishing welfare.

We can assume that in a rather closed economy, costs of final products are either due to employment or material supply. The costs of material supply in turn arise from employment and material supply. But all costs must in the final consequence be due to wages. This is a rather classical or Marxist assumption, but a suitable one in a world where the state - formally the people - holds all the capital, so that it does not play a role as a long-term interest-bearing asset (but only as working capital credit).

Every sector of the economy has several steps of production, where the material is processed to become the final product. We can assume a multiplicity of these production steps with every supplier being a monopolist for its customer (bilateral monopolies). For simplicity we shall assume, that every sector is divided into three firms:¹³⁾ an upstream firm (possibly hauling raw material), an intermediate firm (processing the raw material) and a downstream firm (finishing or trading the product).

As every sector is assumed to have the same structure and with intermodal competition not playing any role,¹⁴⁾ we can aggregate the sectoral model, assuming the whole economy to be made of three large monopolist firms. Furthermore we assume the absence of an informal and a service sector. Especially bank services are provided for by the state monobank.¹⁵⁾ The monobank forms an entity with the fiscal authority: as taxes are being raised and subsidies funnelled through the banking system, the formal division between both authorities becomes unrecognisable (and under central planning also irrelevant).

Under central planning, quantities of production as well as prices and wages are fixed by the political and planning authorities. We assume every worker to be paid the same wage w (according to socialist ideals) and the whole economy produces the fixed amount x of a single good, which is sold at the fixed consumer price CPI . Thereby open inflation is excluded.

2.2 Subsidies and the Aggregate Supply

The means by which monetary authorities in socialist economies tried to achieve monetary stability was to balance the aggregate wage fund (WF) with the

¹³⁾ This division is owed to Rostowski (1994).

¹⁴⁾ The concept of intermodal competition starts from the fact that different products (for example railway transport and cars) stand in competition to each other. It states that even if a railway line is a monopolist, it cannot raise prices too far because of consumers changing to use cars, the price of which decreases relatively. As we do not take into consideration changes in relative prices, the concept has no relevance for the model.

¹⁵⁾ The assumption of the monobank, being a central bank and a commercial bank at the same time, is in no way crucial for the model. We could also assume a two-tiered banking system to be in place, as long as the bulk of banks is still state-owned and shows the same behaviour as in every transition economy.

value of the total amount of consumer goods ($x\text{CPI}$). There are several ways by which monetary imbalances could develop: first, by a decline in the supply of consumer goods, second by an increased state demand for infrastructure investment or military services. Third, monetary supply and thereby aggregate demand was increased by firms temporarily or permanently paying higher wages than planned.¹⁶⁾ Although all three cases were relevant we shall only consider the latter case, abstracting for simplicity from growing inefficiencies in production and excessive state demand.

Although covering costs was a general aim in the Soviet economy - the monobank applied it as a standard to supervise microeconomic performance - not all firms could cover expenditures by current receipts. There are in fact many mechanisms by which firm managers have succeeded in pushing up credit demands.¹⁷⁾ Working capital credits were obtained for purchasing material; excessive accumulation of inventories thereby led to credit expansion and monetary imbalances.¹⁸⁾ By veiling (window-dressing) their effective costs, firms could lower tax payments in order to pay higher wages. Especially when prices of products were set at low levels by the authorities for social reasons firms could count on receiving credit or subsidies. Working capital credits were often similar to subsidies because they sometimes could not and even were not supposed to be paid back.

It is not crucial for our analysis how the central planning agencies were betrayed, but we can say that after the loosening of state control, as a rule, receipts of the state bank fell short of credit expansion (subsidies). For simplicity we shall assume in our model¹⁹⁾ that the intermediate firm B cannot cover the actual costs of its products sold at given producer prices PPI . The costs of B equal the number of workers b times the economy-wide average wage w plus the costs of the material supply from the upstream firm A. The price of the purchase of material supplies from A is equal to its costs which are essentially labour costs - the number of workers a times the average wage w . As the returns on sales of the intermediate firm B which equal $x\text{PPI}$ are lower than its costs $(a+b)w$, B manages to receive subsidies (or alternatively working capital credit) to cover part of its wages. As B's wage payments are equal to bw , the total value of subsidies amounts to sbw , s ($0 < s < 1$) being the share of the wage payments which cannot be covered. With the amount of subsidies being equal to the gap between revenues and costs of B, we can write:

$$(1) \quad sbw = (a + b)w - x\text{PPI}, \quad \text{or}$$

$$(2) \quad x\text{PPI} = (a + (1 - s)b)w, \quad \text{cost covering constraint of B.}$$

¹⁶⁾ For a thorough analysis of all of these mechanisms, see Sahay/Vegh (1995).

¹⁷⁾ For an extensive discussion on conflicts and convergence of interests of the central bank, sectoral bank branches and enterprises under central planning, see Wienen, A. (1994), p. 8ff.

¹⁸⁾ Calvo, G. (1991) shows that the mechanism of extending credit for purchases of inventory actually constitutes a money machine in socialist and post-socialist economies.

¹⁹⁾ The model although being different in many respects is patterned after Sahay/Vegh (1995).

The prices CPI of the final products are set to cover the costs of the downstream firm C. The finishing costs are equal to the value of the products received from B at the subsidised price PPI and the wage costs of C, being equal to the amount of workers c in the firm times the wage w . Thus aggregate supply²⁰⁾ can be written as:

$$(3) \quad xCPI = xPPI + cw, \quad \text{or by substituting (2) into (3)}$$

$$(4) \quad xCPI = (a + (1 - s)b + c)w, \quad \text{cost covering constraint of C.}$$

2.3 Aggregate Demand and the Monetary Overhang

Aggregate demand is derived from the nominal money balances held by the public. This simplification only holds under the assumption that the velocity of money, defined as $V = xCPI/M$, is always unity.²¹⁾ The money supply, representing aggregate demand, changes over time if money is injected into the economy, so that we can write the money supply as a difference equation:

$$(5) \quad M_t = M_{t-1} + \Delta M$$

Changes in the money supply ΔM occur only if the wage fund WF is not balanced with the aggregate supply AS:

$$(6) \quad \Delta M = WF - AS$$

As fixed prices cannot absorb any excess demand, the excess liquidity will not return to the enterprise sector thereby remaining with the consumers forever:

$$(7) \quad \Delta M = (a + b + c)w - xCPI$$

Thus the gap between the wage fund and aggregate supply must be financed by subsidies covered by an expansion in the total money supply. The wage fund and aggregate supply can be substituted to become:

$$(8) \quad \Delta M = sbw$$

The implication of (8) shows the stability problem faced by most centrally-planned economies: the money supply is endogenous. It derives from the amount of credit firms manage to acquire to pay higher wages. This credit acts like wage subsidies paid to the economy (in our model to firm B).

²⁰⁾ With x and CPI given, aggregate supply equals a point in the AS-AD-diagram. See also Bofinger (1994), p. 80.

²¹⁾ This is yet another very monetarist assumption.

Solving the difference equation (5) yields:

$$(9) \quad M_t = M_0 + tsbw, \quad \text{where } M_0 = (a+b+c)w.$$

While the money supply expands as losses are incurred by the state-owned enterprises (SOE), a general monetary overhang MO develops, steadily becoming larger:

$$(10) \quad MO_t = MO_{t-1} + \Delta MO$$

The monetary overhang represents excess demand resulting from the nominal money supply which cannot be absorbed by aggregate supply because of fixed prices:

$$(11) \quad MO_t = M_t - AS$$

By using the equations (10), (11) and (5) it can be shown, that :

$$(12) \quad \Delta MO = \Delta M,$$

which means that any liquidity injection leads to an increase in the monetary overhang: The monetary overhang will develop as follows:

$$(13) \quad MO_t = MO_0 + tsbw, \quad \text{the initial overhang } MO_0 \text{ being equal to 0.}$$

The monetary overhang is the result of monetary imbalances in the Soviet-style economy. The symptoms of these imbalances are growing shortages and queues in state-owned shops as well as the emergence of a black market.

2.4 Consequences of the Regime-Change

2.4.1 The Impact of Price Liberalisation on the Price Level

The standard reform package introduced in centrally planned economies to start the process of transition to a market economy was an initial price liberalisation together with broad measures to cut subsidies. Thus in our model, if at some point in time (L) prices are allowed to adjust so that aggregate supply and aggregate demand are matched, the following condition must always be satisfied:

$$(14) \quad AS_t = AD_t = M_t$$

To show the initial impact of price liberalisation, we consider condition (14) at L.

$$AS_L = AD_L = M_L, \quad \text{or substituted by (9)}$$

$$(15) \quad xCPI_L = (a + b + c)w + Lsbw$$

Under the assumption that prices are upwardly flexible but downwardly rigid, the consumer price index will adjust instantly to become:

$$(16) \quad CPI_L = \frac{w}{x} [a + b(1 + Ls) + c], \quad \text{with the initial price hike being:}$$

$$(17) \quad CPI_L - CPI_0 = \frac{Lsbw}{x}$$

2.4.2 Destatification and the Response of Wages

After the loosening of state control over state-owned enterprises (SOE) during the era of Perestroika and during the dismantling of the plan later on, the vacuum of power created in SOEs was filled by insiders.²²⁾ Workers and managers managed to acquire large stakes in firms. On the one hand, substantial amounts of shares were passed out to the work force in the initial wave of privatisation and workers sometimes even acquired appointing power. On the other hand, spontaneous privatisation helped managers to retain control.²³⁾ The interests of workers and managers - higher wages and job security - perfectly match.

As the future became more and more uncertain, enterprises developed an orientation toward survival.²⁴⁾ This tendency was reinforced by the lack of management skills and experience required in a market economy.²⁵⁾ Survival orientation of managers requires the management to remain on co-operative terms with workers. Keeping workers co-operative involves passing on enterprise profits and paying wages in time. It also implies restraining investment down to basic replacements.

Upon price liberalisation, workers will see their real money balances wiped out by inflation and real wages reduced to a fraction of their previous level. Furthermore they will see enterprise profits rise. They will therefore instantly seek compensation for the loss of wealth they have incurred by demanding higher wages. Due to the survival orientation of SOEs, managers have been reluctant to resist wage-pressures from the workers' councils. Empirically, this is what happened: workers have been successful in calling for higher wages.

²²⁾ See Fan/Schaffer (1994), p. 153.

²³⁾ According to Johnson/Ustenko (1993), p. 86f, spontaneous privatisation implies the transfer of assets of a SOE to a private enterprise, mostly involving irregularities such as bribery or undervaluation of assets.

²⁴⁾ See Dolgopyatova/Evseyeva (1995), p. 320.

²⁵⁾ Bruno (1992) calls this effect the "management shock".

We can therefore conclude that the process of wage-bargaining is one of workers trying to compensate for reductions in the real wage and managers yielding to this pressure. We will simply assume that wages increase according to increases in the consumer price index.

$$(18) \quad w_t = \frac{CPI_t}{CPI_{t-1}} w_{t-1}, \quad \text{or likewise}$$

$$(19) \quad \frac{w_t}{w_{t-1}} = \frac{CPI_t}{CPI_{t-1}}$$

As wages always tended to be low and the defence of real wages from inflationary pressures is supposed to be a legitimate aim in the political landscape of the former Soviet Union, we can regard was being the minimum wages guaranteed by the state.

3. Microeconomic Optimisation in the Transition Phase

3.1 Control Rights and Management Incentives

As a consequence of destatification, manager interests show a remarkable degree of congruity with worker interest. This congruity is most often modelled by linking manager compensation to the amount of wages paid.²⁶⁾ As a consequence, the priority of outgoing payments is set on wages. In fact, surveyors could even observe a priority list in regards to outgoing payments.²⁷⁾ Experience shows that tax arrears are incurred only very rarely, while payments to suppliers are usually delayed for at least some time. Wage payments have quite a high priority followed by payments to banks.

The reason for the strict priority for timely tax payments seems to be that tax arrears usually signal to the factual owner (the state) that the enterprise has serious liquidity problems. The danger would arise that the state will take sanctions against the firm with the threat of eventually closing it down. Another danger the firm has to be eager to avoid is the threat of workers revolting against management in cases of late wage payments. Payments to suppliers have the lowest priority. Due to the underdevelopment of bankruptcy legislation and jurisdiction, firms that fall into arrears with suppliers usually don't face any threat of being sued. Furthermore suppliers expose a large degree of passivity, the main reason for which is supposed to be the rigidity of economic structure: suppliers just do not have a choice.²⁸⁾

²⁶⁾ See Aghion/Blanchard/Carlin (1994), p. 6.

²⁷⁾ See Alfanderi/Schaffer (1996), p. 21.

²⁸⁾ See Daianu (1994). For an elaborate explanation of the concept "creditor passivity" in the transition phase, see Mitchell (1993).

Another important factor in microeconomic decision-making arises from the lack of financial information in the economy. As long as their overall nominal budget is balanced firms prove to be viable and are not in danger of being closed down. Therefore, if suppliers are not paid, they cannot be blamed for it. Prior to transition the balanced-budget criterion was used by the Gosbank to control the firms' compliance with the plan. As money didn't play an active role, credit was extended to SOEs lacking financial resources to pay workers, but only as long as their budgets were nominally balanced. After the dismantling of the central plan, this method continues to remain in practice in most banks while auditing methods are still not elaborate.²⁹⁾

3.2 Maximising Firms' Utility

Firms try to maximise their utility functions which are represented by the wages paid to their workers $((1+\alpha)aw$ or $(1+\beta)bw$ or $(1+\gamma)cw$).³⁰⁾ By increasing their mark-up firms tend to fall into arrears $((1-n)C)$ to suppliers. As arrears are growing they face a real danger to be sanctioned either by a government agency or by the suppliers. Therefore arrears diminish firms' utility by a factor, that is itself dependent on the amount of arrears and on the factor λ which encompasses the state of bankruptcy legislation and governmental control over enterprises. Furthermore an increasing mark-up bears the danger of attracting competitors, so that utility diminishes proportional to the mark-up times a competition factor μ . For the firms A, B and C, the utility functions are:³¹⁾

$$(20) \quad U_a = (1 + \alpha)aw_t - \mu\alpha aw \quad \text{utility function of A,}$$

$$(21) \quad U_b = (1 + \beta)bw_t - \frac{\lambda}{(1-k)aw} (1 - n_a)^2 C_a^2 - \mu\beta bw \quad \text{utility function of B,}$$

$$(22) \quad U_c = (1 + \gamma)cw_t - \frac{\lambda}{(1-k)aw} (1 - n_b)^2 C_b^2 - \mu\gamma cw \quad \text{utility function of C}$$

Utility maximisation is subject to the cash constraints firms are facing. These cash constraints are respectively:

²⁹⁾ See Ickes/Ryterman (1992), p. 346. Some argue, that the balanced-budget criterion is applied due to the uncertainty in the economy arising from shifts in the structure of demand, in relative prices and in the overall price level. See Herr/Tober/Westphal (1994).

³⁰⁾ Where α , β and γ stand for the mark-up set by the firms A, B and C respectively on wages. C are the costs of the respective firms mentioned in the subscript and n represents the share of the supplies paid in cash (nalichnyye), for all $n \mid 0 < n < 1$.

³¹⁾ The overall cash constraint at the outset of reform is:

$$xCPI_0 = cw_0 + bw_0 + kw_0.$$

$$(23) \quad n_a C_a + \Delta B_t = (1 + \alpha) a w_t \quad \text{the cash constraint of A,}^{32)}$$

$$(24) \quad n_b C_b = (1 + \beta) b w_t + n_a C_a \quad \text{the cash constraint of B,}$$

$$(25) \quad x C P I_t = (1 + \gamma) c w_t + n_b C_b \quad \text{the cash constraint of C.}$$

Any supplier or bank will naturally extend credit only to viable firms. In an environment with uncertainty and a lack of financial information due to underdeveloped auditing procedures, viability refers to firms exposing a nominally balanced budget, where the costs for wages and supplies are fully covered by cash receipts or/and overdue receivables. Therefore, in addition to the cash constraints, firms that need to receive trade or bank credit are facing the following balanced budget constraints:

$$(26) \quad (1 + \alpha) a w_t = n_a C_a + (1 - n_a) C_a \quad \text{balanced budget constraint of A.}$$

$$(27) \quad C_b = C_a + (1 + \beta) b w_t \quad \text{balanced budget constraint of B.}$$

Combining B's cash constraint (24) and the balanced budget constraint (27) will show, that any arrears incurred by B from the downstream firm C will be passed on to the upstream firm A immediately:

$$(28) \quad (1 - n_b) C_b = (1 - n_a) C_a$$

The downstream firm C will now maximise utility by choosing an optimal value for its policy variable γ . It can be found by deriving the utility function:

$$(29) \quad \frac{\partial U_c}{\partial \gamma} = c w - \mu c w - \frac{2\lambda c w}{(1-k)aw} [(1-k)aw - \gamma c w - \beta b w] = 0$$

$$(30) \quad \gamma^* = \left(\frac{1-\mu}{2\lambda} - 1 \right) \frac{(1-k)aw}{c w} - \beta \frac{b w}{c w}$$

Equation (30) clearly suggests that the decision of the downstream firm C depend on the decision of the intermediate firm B. The latter knows about the rigid structure of the economy that allows it to a certain extent to impose prices on his customers. Besides, there is an information asymmetry arising from the fact, that B knows the exact costs of its products. As B is also the first mover in the "game", we can effectively model him as a Stackelberg-leader, who is assumed to take into account the decisions of C. The reaction of C to a change in β set by B is determined by the following equation:

³²⁾ With ΔB referring to bank credit expansion.

$$(31) \quad \frac{\partial \gamma^*}{\partial \beta} = -\frac{bw}{cw}$$

By deriving the utility function of B with respect to β and by including conjecture (31), we can determine the optimal policy of the intermediate firm B.

$$(32) \quad \frac{\partial U_b}{\partial \beta} = bw - \mu bw - \frac{2\lambda}{(1-k)aw} [(1-k)aw - \gamma cw - \beta bw] \left(bw - \frac{\partial \gamma^*}{\partial \beta} cw \right)$$

$$(33) \quad \frac{\partial U_b}{\partial \beta} = (1 - \mu)bw$$

Equation (33) shows, that the decision of B is not affected by the factor of proportionality λ that describes the state of bankruptcy legislation. The rationale for this finding is that if the intermediate firm does not set a maximal mark-up, the downstream firm will do it. As long as the competition factor μ is below a certain level (i.e. 1) incremental utility is positive with respect to increases in β . In this case the intermediate firm B has incentives to push β to its maximum level, that is reached, when γ is zero.

$$(34) \quad \beta^* = \left(\frac{1 - \mu}{2\lambda} - 1 \right) \frac{(1 - k)aw}{bw}$$

For low values of λ and μ , the maximum level of β is also determined by the overall cash constraint in the economy. As bankruptcy legislation is still poor and competition low in post-Soviet countries, we will assume for the rest of the paper that β reaches its maximum level

$$(34') \quad \beta = \frac{xCPI_0}{bw_0} - \frac{c + b}{b}$$

3.3 The Extension of Bank Credit

By implying the conclusions reached above ($n_a=0$), we can determine n_b :

$$(35) \quad n_b = 1 - \frac{C_a}{C_b} = \frac{(1 + \beta)bw_t}{(1 + \beta)bw_t + (1 + \alpha)aw_t}$$

The paper deficit ΔD incurred by the downstream firm C is completely reflected in the arrears it runs up in every period:

$$(36) \quad \Delta D = (1 - n_b)C_b = (1 - n_a)C_a \quad \text{as } n_a=0, \Delta D \text{ becomes:}$$

$$(37) \quad \Delta D = (1 + \alpha)aw_t.$$

Although C does not expose a balanced budget, B will be reluctant to take measures against C, because B is able to pay very high wages. A will for its part be reluctant to take measures against the intermediate firm, as long as B complies with its balanced budget constraint. But if A does not receive any cash from its suppliers, it will not be able to pay its workers unless a bank extends enough credit.

Except for corruption and long-standing personal relations of bankers and managers, there are usually several other reasons why banks in post-Soviet economies go on financing illiquid SOEs: First, if a major part of the bank's shares is owned by a firm, the bank will be forced to extend credit to it.³³⁾ Second if the SOE is the major client of the bank, the bank itself will get into serious liquidity troubles if the enterprise defaults - it will therefore have incentives to keep the SOE afloat. This behaviour of bankers is perfectly rational in an environment of incomplete information as long as an SOE can show a nominally balanced budget.

Besides the above-mentioned factors that derive from the theory of property rights, there are specific reasons for the extension of credit that arise from the political economy.³⁴⁾ The extension of credit by the ministry of finance or the central bank via the banking system has been a common feature in post-Soviet economies. Political leaders have strong incentives to finance illiquid SOEs in order to avoid the threat of social unrest and because they face considerable pressure from SOE managers in parliament.³⁵⁾ Furthermore, as long as the respective firms show a nominally balanced budget there will not even be any reason for governments to refuse the extension of credit.

In our model, A will make a demand for the extension of bank credit while exposing a balanced budget and pointing at B not paying. Having only received enough money to pay wages, B exposing a balanced budget is not to blame either for falling into arrears. To give A the possibility to go on producing while waiting for the overdue payments to arrive, the bank will extend credit. But as the upstream firm will not be able to receive credit in excess of the minimum wages needed to avoid upheavals. The cash constraint of A, equation (23), therefore becomes:

$$(38) \quad \Delta B_t = aw_t - n_a C_a \quad \text{in case } aw_t > n_a C_a \text{ and}$$

$$(39) \quad (1 + \alpha)aw_t = n_a C_a \quad \text{in case } aw_t < n_a C_a.$$

As n_a is likely to be zero, (39) does not represent a relevant case. Substituting the balanced-budget-constraint (32) into (38) yields:

³³⁾ For a taxonomy of banks in Russia, see Gorbatova (1995), or for a brief description see Hinds (1993), p. 295f.

³⁴⁾ On the political economy of the money supply, see Hartwig (1995).

³⁵⁾ For an elaboration of the Russian case, see Lewarne (1995).

$$(40) \quad \Delta B_t = (1 - n_a)C_a - \alpha aw_t$$

But as $C_a = (1 + \alpha)aw_t$, (40) can be transformed to:

$$(41) \quad \Delta B_t = aw_t - n_a(1 + \alpha)aw_t \quad \text{or to}$$

$$(42) \quad (1 - n_a)C_a = \Delta B_t + \alpha aw_t$$

Equation (41) shows that bank credit expansion is at every point in time determined by the sum of minimum wages minus the share of costs that have been paid in cash by the clients. The above results showed that n_a can be expected to equal zero, so that the credit expansion will be equal to the sum of minimum wages paid by firm A. Equation (42) shows that the amount of trade credit extended by A to B is equal to its bank credit received plus the complete mark-up on minimum wages.

Some confusion might arise as to the size of the mark-up α in case the cash payment of the client doesn't even cover the minimum wages. A positive α would cause A's paper profits to rise. A would in return not have any possibility to pass on the profits to its workers. If workers had a dominant role in the firm, this would fan workers' discontent over management decisions. Managers could chose to move into a defensive position by lowering α to zero thereby reducing paper profits they would not be able to call in anyway. As an alternative, they could pass on the mark-up to their workers falling into wage arrears at the same time. Under this assumption, new wage arrears (ΔW) would amount to:

$$(43) \quad \Delta W_t = \alpha aw_t$$

3.4 Results: Microeconomic Implications of the Regime-Change

The regime change, that started out with the abolishment of subsidies and the tightening of credit conditions was supposed to move firms from soft to hard budget constraints.³⁶⁾ This step nevertheless yielded paradoxical results. First, although on a microeconomic level it can be proved that firms are subject to hard budget constraints, on the macroeconomic level, the economy still faces soft budget constraints. Although state budget deficits have been reduced by the amount of subsidies, the injection of new credit will lead to high inflation. This outcome of the model perfectly matches with post-Soviet realities. Second, the introduction of market forces that was supposed to separate loss makers from viable firms leads to complete confusion: Seemingly viable firms turn out to be illiquid (A), former loss makers (B) become viable while paying very high wages, formerly viable firms (C) become loss makers, accumulating "paper" liabilities. By facilitating the confusion

³⁶⁾ For an elaboration on the concept of "soft budget constraints", see Kornai (1992).

over the viability of firms and macroeconomic soft budget constraints, arrears represent a major impediment to economic recovery.

The mechanism that leads to the paradoxical phenomena has been explained by the model: The intermediate firm B, knowing that C will reduce cash payments to the required minimum, sets its wages (or the mark-up β on minimum wages) so as to maximise its cash receipts. Receiving just enough cash to pay its workers, B falls into arrears to the upstream firm A. This does not cause any problem for B, because all these arrears are covered by liabilities C has incurred towards B. B thus exhibits a balanced budget, thereby meeting the balanced budget constraint needed to prove viability to the owner (state) and to creditors. The result is that the upstream firm A will not receive any cash to pay its workers. It will therefore need to take credit from its bank or be given subsidies from the state. In a world of incomplete information, firms exposing a nominally balanced budget a) prove their alleged viability, b) exhibit enough assets to compensate their creditors and c) are not to blame for not being paid. In addition, banks in transition countries have no incentives to impose financial discipline on a firm if it represents either its major client or owner. If banks would still not be willing to extend credit on these terms, the government would have strong incentives to do so: a) the government would not want to close seemingly viable firms that can be sold for large sums in privatisation, b) it would be afraid of workers revolting because of not getting paid.

As the upstream firm A can be sure to receive help from outside, the downstream firm C is effectively squeezed out by its own maximisation calculus anticipated by firm B. It is forced to run into deficit, accumulating arrears toward its supplier. Although this decapitalises the downstream firm, it would continue to produce, because its major constraint - paying cash to workers - is always met, and producing is still better than not producing. Besides, it can expect the arrears to be cancelled when it becomes clear that these are irretrievable, "bad" debts. To endorse the pledge for a general bail-out of arrears, it will blame the deficit on "the continuing inflation that wipes out the real value of working capital", which has often been the case in transition countries.

We could attribute the responsibility for the credit expansion to the government or the banking system who are continuing to extend credit to the economy in order to keep firms afloat. The conclusions reached by this model give a slightly different interpretation. Banks and the government are only reacting to the developments that are the result of intrinsic features of the transition process: a) the rigid structure of the economy that give firms no alternative to the existing trade channels, b) the lack of corporate governance in firms, c) the absence of adequate legislature and enforcement mechanisms, d) the mark-up behaviour of firms and their setting cost-prices, and e) the priority list of making payments. All these factors combined, create an environment where firms' optimising behaviour results in arrears and inflation. The process of arrears accumulation and high inflation rates is examined in the next chapter.

4. A Macroeconomic Model of the Post-Soviet Economy

4.1 The Model, Wages and Inflation

In order to analyse the impact of the implications of the regime change on the macro economic level, the changes in the incentives structures of all economic actors have to be included into the model from section 3.2. To outline the basic model, we return to condition (14) which states that aggregate supply and aggregate demand have to equalise ex-post.

$$(14) \quad AS_t = AD_t$$

Aggregate demand is a function or, in the simplest case, is determined by the money supply:

$$(45) \quad AD_t = M_t$$

The money supply depends on the overall amount of cash handed out to workers as wages in the previous period:

$$(46) \quad M_t = aw_{t-1} + (1 + \beta)bw_{t-1} + cw_{t-1}$$

As firms were assumed to continue producing output and shipping it to each other even though they are not paid, aggregate supply of goods is the same as prior to price liberalisation. Aggregate supply will therefore only adapt to aggregate demand by rising prices:

$$(47) \quad AS_t = xCPI_t$$

Aggregate supply again represents the amount of products times consumer prices, which equals cash revenue received by the downstream firm C. This cash is in turn used to pay suppliers and workers. Under the above conclusions the cash can be divided into wages paid to the workers of C and B (as A does not receive any cash except from its bank):

$$(48) \quad cw_t + (1 + \beta)bw_t = xCPI_t \quad \text{distribution of receipts}$$

In chapter 2.4.2 we saw that the increase of wages is determined by the increase in the price index:

$$(19) \quad \frac{w_t}{w_{t-1}} = \frac{CPI_t}{CPI_{t-1}}$$

The producer price index is itself a function of wages:

$$(49) \quad xPPI_t = (1 + \alpha)aw_t + (1 + \beta)bw_t, \quad \text{as is its increase:}$$

$$(50) \quad \frac{PPI_t}{PPI_{t-1}} = \frac{w_t}{w_{t-1}}$$

Recognising wages and producer prices as an endogenous function of the price index forces us to determine the rise in consumer prices. Combining the equations (14), (45), (46), (47) and (48) yields:

$$(51) \quad \frac{CPI_t}{CPI_{t-1}} = \frac{a + (1 + \beta)b + c}{(1 + \beta)b + c}, \quad \text{the inflation rate being:}$$

$$(52) \quad \pi = \frac{CPI_t - CPI_{t-1}}{CPI_{t-1}} = \frac{a}{(1 + \beta)b + c}$$

and the change in the price index amounting to:

$$(53) \quad CPI_t - CPI_{t-1} = \frac{a}{x} w_{t-1}$$

which is equal to new credit extended in period t-1 per real output:

$$(54) \quad CPI_t - CPI_{t-1} = \frac{\Delta B_{t-1}}{x}$$

Equation (54) points to the monetarist statement that any increase in the price level has ultimately monetary sources - in this case an expansion of credit given to the economy. The rate of expansion (and thereby the inflation rate itself) is determined by the relative weight of the upstream firms' sector to the rest of the economy.

Equation (18) demonstrating the time path of wages, and equation (53) rewritten as (55) form a system of difference equations:

$$(18) \quad w_t = \frac{CPI_t}{CPI_{t-1}} w_{t-1}$$

$$(55) \quad CPI_t = CPI_{t-1} \left(1 + \frac{a}{x} * \frac{w_{t-1}}{CPI_{t-1}} \right)$$

By using equation (18) it can be shown that:

$$(56) \quad \frac{w_{t-1}}{CPI_{t-1}} = \frac{w_0}{CPI_0} \quad \text{making } CPI_t \text{ dependent on constants:}$$

$$(57) \quad CPI_t = CPI_{t-1} \left(1 + \frac{aw_0}{xCPI_0} \right)$$

Equation (57) will yield the following solution:

$$(58) \quad CPI_t = CPI_0 \left(1 + \frac{a}{(1+\beta)b+c} \right)^t \quad \text{or}$$

$$(59) \quad CPI_t = CPI_0 \left(1 + \frac{aw_0}{xCPI_0} \right)^t \quad \text{so that (18) becomes}$$

$$(60) \quad w_t = w_0 \left(1 + \frac{aw_0}{xCPI_0} \right)^t$$

The equations (59) and (60) show the growth path of wages and prices under the assumptions of firms' optimising behaviour and of the reaction of labour to inflation made in the previous chapters. The two variables grow exponentially as the second term in the parenthesis is always positive (so that the whole term is bigger than one).

4.2 Expansion Paths of Credit, Arrears and Deficits

The amount of bank credit B to the economy is also an ever increasing function of the relative weight of the cost of upstream firms to firms further downstream:

$$(61) \quad B_t = B_{t-1} + \Delta B_t, \quad \text{or}$$

$$(62) \quad B_t = B_{t-1} + aw_t \quad \text{the solution of which is}$$

$$(63) \quad B_t = xCPI_0 \left(1 + \frac{aw_0}{xCPI_0} \right)^t - xCPI_0 \quad \text{as } B_0 \text{ is presumably 0}$$

The monetary aggregate M2 can be written as:

$$(64) \quad M2_t = B_t + M2_0 \quad \text{where } M2_0 \text{ is presumably } xCPI_0, \text{ so that}$$

$$(65) \quad M2_t = xCPI_0 \left(1 + \frac{aw_0}{xCPI_0} \right)^t$$

Gross trade arrears defined as „overdue trade credit payable“ in the whole economy will be:

$$(66) \quad A_t = A_{t-1} + (1 - n_b)C_b + (1 - n_a)C_a \quad \text{which can be rewritten as:}$$

$$(67) \quad A_t = A_{t-1} + 2(1 + \alpha)aw_t \quad \text{the solution of which is:}$$

$$(68) \quad A_t = 2(1 + \alpha)xCPI_0 \left(1 + \frac{aw_0}{xCPI_0} \right)^t \quad \text{where } A_0 \text{ is presumably } 0.$$

The overall deficit D of the enterprise sector towards the other sectors of the economy (for example the banking or state sector) is derived from the individual deficit incurred by the downstream firm C , as the other two firms have to comply to the balanced budget constraints:

$$(37) \quad \Delta D = (1 + \alpha)aw_t \quad \text{so that the solution of equation}$$

$$(69) \quad D_t = D_{t-1} + \Delta D_t \quad \text{will be}$$

$$(70) \quad D_t = (1 + \alpha)xCPI_0 \left(1 + \frac{aw_0}{xCPI_0} \right)^t.$$

It becomes immediately clear that there may be a discrepancy between the overall deficit and bank credit extended to the enterprise sector. As we found out, any wage increases of the upstream firm above the minimum wage would not be covered by the banking sector. This implies that the difference between bank credit and the overall deficit has to be borne by the consumer sector, more exactly by the workers of firm A who will not get paid their premiums. This will be reflected in wage arrears W , the increase of which has already been derived:

$$(43) \quad \Delta W_t = \alpha aw_t \quad \text{the growth path of which is}$$

$$(71) \quad W_t = W_{t-1} + \Delta W_t, \quad \text{with the solution}$$

$$(72) \quad W_t = \alpha xCPI_0 \left(1 + \frac{aw_0}{xCPI_0} \right)^t.$$

4.3 Real Credit, Real Arrears and Ratios

The analysis of the previous chapters has shown that the consumer price index, the amount of arrears and the amount of credit extended to the economy will take truly epic proportions. In order to make a judgement about the magnitude of the problem loans building up, it seems advisable to consider the above derived variables in real terms. This can be done by deflating them with the consumer price index. Dividing (65) by (59), broad money ($M2$) in real terms will therefore yield:

$$(73) \quad \frac{M2}{CPI_t} = x$$

which derives from the monetarist assumption that prices only reflect changes in the money supply. Inter-enterprise arrears and wage arrears are derived by dividing (68) and (72) respectively by (59):

$$(74) \quad \frac{A_t}{CPI_t} = 2(1 + \alpha)x$$

$$(75) \quad \frac{W_t}{CPI_t} = \alpha x$$

The analysis shows that real arrears and real broad money will remain constant over time. The magnitude of the arrears problem appears limited until now, although the fast rising nominal variables constitute a problem of their own.

Other ratios that are of interest include the ratios of inter-enterprise and wage arrears to broad money:

$$(76) \quad \frac{A_t}{M2_t} = 2(1 + \alpha)$$

$$(77) \quad \frac{W_t}{M2_t} = \alpha \quad \text{both ratios being constant over time.}$$

4.4 Results: Macroeconomic Implications of the Regime Change

The regime change implemented under the conditions of the transition economy outlined above with its inherent incentives endogenises the money supply. The money supply is determined by inter-enterprise arrears that arise from monopoly power and rising labour costs. Labour costs are in turn determined by the price increases which are due to the expanding money supply. This spiral finds its starting point at the beginning of price liberalisation, when the monetary overhang

is eliminated by the so-called adjustment inflation. From this point on, all nominal variables, such as bank credit, inter-enterprise arrears, wage arrears and the money supply expand exponentially and indefinitely. In this situation, the correlation of arrears and inflation must be positive.

In turn, after the beginning of transformation, all the above-mentioned variables remain constant in real terms. This is the case only if banks keep on financing the upstream firm at a nearly zero interest rate. As the real value of the inter-enterprise arrears stays the same, there would be a realistic possibility for a central planner, being in control of the firms, to return almost all credits by forcing the enterprises to pay off all debts with their received money. The so-called *stock problem* remains negligible.

5. Monetary Policy Action

The analysis of the previous chapters has demonstrated the serious stability problem arising from the economic structure and the specific incentives of economic agents. It is clear that the described inflationary and debt accumulating processes have to be stopped at some point in time, in order to achieve monetary stability to enhance investment. In the following chapters, different measures will be considered and analysed according to their impact on the economy. In the following, it is assumed that at time T , which is situated after price liberalisation, policy steps will be taken. Thereafter the consequences of the measures will be discussed.

5.1 Introducing Interest Rates

The introduction of (very) high interest rates will raise the credit costs of the upstream firm A. This will raise the overall cost of firm A by the factor $(1+i)$, where i is the interest rate imposed by the banking system. To cover its costs, A will increase prices. B will not be able to pay, because it will only receive enough money from C to cover wage costs, as C's incentives have not changed: the cost of arrears did not rise higher than the cost of cash payments.

The situation will be the same as before with A still not receiving any money and therefore not being able to pay either principal or interest to the banking system. The banks will be forced to roll over the credits and capitalise the interest. The rising costs of A will reflect in the trade credit extended to B, which the latter will immediately pass on to C according to equation (34), in order to balance its own budget. Thereby bank credit extended to the upstream firm A becomes:

$$(78) \quad B_t = (1+i)B_{t-1} + \Delta B_t, \quad \text{which yields the solution:}$$

$$(79) \quad B_t = \frac{aw_0}{\frac{aw_0}{xCPI_0} - i} \left[\left(1 + \frac{aw_0}{xCPI_0} \right)^t - (1+i)^t \right]$$

Real bank credit will be determined by (80):

$$(80) \quad \frac{B_t}{CPI_t} = \frac{aw_0}{aw_0 - ixCPI_0} \left[1 - \frac{(1+i)^t}{\left(1 + \frac{aw_0}{xCPI_0} \right)^t} \right]$$

Whether real bank credit will follow an explosive expansionary path or not, will be determined by the relation between the interest rate i and the ratio of paid upstream wages and the production value ($aw/xCPI$):

If $i < \frac{aw_0}{xCPI_0}$ real credit will tend to $\frac{aw_0}{aw_0 - ixCPI_0}$ if t becomes indefinite.

If $i > \frac{aw_0}{xCPI_0}$ real credit will expand explosively over time.

Inter-enterprise arrears will increase in the same way as bank credit. The deficit of the downstream firm will grow even faster and the banking sector will start to make paper profits, but the situation will remain the same: B forces C to pass on its cash and A will not get paid and cannot return loans. In relation to a situation without interest rates, producer prices will be higher at every point in time, while consumer prices remain the same, due to the fact that the same amount of cash is circulating in the economy.

It becomes intuitively clear that high interest rates do not represent a threat to firms that run up arrears as long as banks continue to roll over credits and if firms can impose higher prices on clients thereby complying with their balanced budget constraint. Under the assumptions made, high interest rates have no positive impact, but make the situation even worse by enlarging the overall enterprise sector deficit and making loans irretrievable, thereby forcing the banking sector into bankruptcy.

5.2 Cutting Bank Credit

Another often proposed policy variant is the stopping of central bank credit auctions thereby cutting off all refinancing resources from banks. The purpose of this action would be to change the incentives for the upstream firm A which will be left without money to pay wages. The rationale is that firm A will be forced to take

measures against its clients, disregarding the fact that the reactions of firm A depend on the reactions of other economic agents. Therefore, after naming some general consequences of the policy measure, we will have to develop scenarios to be able to draw conclusions for the behaviour of economic actors.

The most important consequence of the cut in bank credit will be an immediate halt of the inflationary process. Equation (46), which represents the cash wages passed out to workers has to be rewritten, as A cannot pay workers:

$$(81) \quad M_t = (1 + \beta)bw_{t-1} + cw_{t-1}$$

Combining the equations (14), (45), (81), (47) and (48) again, we will see that the inflation rate is effectively zero. Therefore also the wage increase will be stopped, which is implied in (19).

- A Scenario With Passive Workers -

It now depends foremost on the workers' reaction to the non-payment of wages. A first scenario can be built assuming that workers remain passive. This assumes that the labour market is such that they have more incentives to work than to leave their jobs. The incentives might arise from the fact that (first) the labour market offers no other job opportunities and that (second) they believe that wages will be paid at some point in time. As the upstream firm can prove not to be a loss-maker, workers have good reasons to believe that the state will assume responsibility for the enterprise, which at this stage of the transition might still be in state property. Even if the enterprise is already privatised, they might still believe that the state is responsible for citizens, so that they will not be left without pay for too long.

At least in the first periods after the credit cut, workers can be expected to take the above-mentioned standpoint and to keep on working as if nothing happened. Therefore we will see inter-enterprise arrears rising as before:

$$(82) \quad A_{t+T} = 2(1 + \alpha)xCPI_0 \left[\left(1 + \frac{aw_0}{xCPI_0}\right)^{t+T} + \left(1 + \frac{aw_0}{xCPI_0}\right)^T - 1 \right]$$

As bank credit stagnates, wage arrears will sharply rise

$$(83) \quad W_{t+T} = (1 + \alpha)xCPI_0 \left[\left(1 + \frac{aw_0}{xCPI_0}\right)^{t+T} + \left(1 + \frac{aw_0}{xCPI_0}\right)^T - 1 \right]$$

Besides the explosive nominal increase, the inter-enterprise and wage arrears will no longer remain constant in real terms. Indeed, they will show an explosive increase in real terms, expressed in the following equations:

$$(84) \quad \frac{A_{t+\tau}}{CPI_{\tau}} = 2(1+\alpha)x \left[\left(1 + \frac{aw_0}{xCPI_0}\right)^t + 1 - \frac{1}{\left(1 + \frac{aw_0}{xCPI_0}\right)^T} \right]$$

$$(85) \quad \frac{W_{t+\tau}}{CPI_{\tau}} = (1+\alpha)x \left[\left(1 + \frac{aw_0}{xCPI_0}\right)^t + 1 - \frac{1}{\left(1 + \frac{aw_0}{xCPI_0}\right)^T} \right]$$

The explosive build-up of real arrears will result in an increasingly bankrupt downstream firm C, and in rising receivables and payables for the firms A and B that have to comply with the balance budget constraint. As the receivables expand in real terms, it becomes increasingly difficult to be able to recover this trade credit over time. Therefore this credit is about to turn "bad", as their return becomes more and more hopeless. Effectively, a real stock problem will arise creating a serious impediment to privatisation and economic recovery.

- A Scenario with Workers Pressuring for a Bailout -

Whatever the incentives for workers might be, at some point in time, the situation will become untenable for workers in one way or the other. They would have the choice to start leaving the factory or to start appealing to and revolting against their managers or the government. In the latter case, which we will consider in this chapter, production and the build-up of arrears may continue for a while. The management of A will be able to blame the "non-payments" on the firms further downstream while pointing at the balanced budget. Firm B will itself point to its own balanced budget, blaming C for not paying enough money. C will hold low demand of the population (nyeplateshesposobnyi spros = low purchasing power) responsible for the low amount of receipts and for its deficit, which is attributable to wages not being paid in the economy.

As everyone will be able to put the blame on the other, the three firms could as well unite against the government, which - in their eyes - has initiated the crisis by cutting off credit. With "not enough money" in the economy, the central bank lets industry die intentionally, thus the reproach aimed at the government. The end of the story is likely to be a general government bailout or another type of inflationary financing of the arrears. Especially in a situation with a government in a weak position or approaching elections, the outcome will probably be some sort of ad hoc remedy to a mounting crisis.

In case the workers leave the enterprises or reduce working hours and effort, production and productivity fall. Output will no longer be constant as assumed above but will collapse. If no bail-out occurs, following the mechanisms described above,

the lower output leads to increasing prices, which will result in increasing wages. The sum of wages in the enterprises B and C will rise as workers in the upstream firm A continue to have ever lesser incentives to work, thereby reducing output down to zero in the long run. Production will come to a standstill.³⁷⁾

5.3 Imposing Cash-In-Advance Constraints

Another policy could be a general ban on trade credit by the government in order to impose a cash-in-advance regime. The effect of this policy variant will turn out to be even more fatal than the above-described slow breakdown of production caused by the cut in bank credit. So far we have assumed that trade credit is a way to finance production on a short-term basis in any case. Only the misuse of trade credit to get long-term financing, i.e. the deliberate falling into arrears with each other leads to the described economic disruptions. The short-term trade credit is meant to be paid back after one period, when the cash is received from the final consumers and passed on to workers and firms further upstream.

This short-term financing is necessary in every economy to assure production by bridging the time necessary to sell off the goods. The prepayment to the upstream firm for the raw material is required from the intermediate firm at a time when money is still with the consumers or accumulating in the downstream firm. Therefore the upstream firm will not be able or wanting to ship its goods to the intermediate firm, stopping the whole production process immediately.

Unfortunately the government most often cannot choose to impose or do away with cash-in-advance constraints on the economy, rather they arise themselves. In an environment of misuse of institutions and mutual agreements, distrust arises. This lack of confidence may persist even if new institutions (for example: registries of collateral) are introduced, so that economic disruptions become immanent in the economy.

6. Policies to Change Incentives

6.1 Imposing a Penalty on Arrears

The incentives of the downstream firm C are the crucial factor in the model which causes arrears to rise. As the downstream firm's costs of paying the supplier are higher than the costs of falling into arrears, it will reduce payments to a

³⁷⁾ There is a faint possibility that downstream firms will recognise the collapse of upstream production as a real threat to their own well-being. Even if they don't blame the collapse of production on the government as a deliberate attack on the enterprise sector, and even if the intermediate firm recognises the need to pay off trade credit, it is questionable if the downstream firm will change its behaviour. The incentives of the downstream firm, namely to pay only the amount of money B needs to pay wages will not be changed, as the direct costs of arrears have apparently not changed.

minimum. Knowing that C will only pay the wage costs of B to keep co-operative terms, B raises wage costs as high as possible. This means that only a change in the incentive structure of clients will be able to change the expectations of suppliers and finally stop the accumulation of arrears.

- Choosing the Right Penalty -

A real change of incentives will only occur if the costs of arrears are effectively higher than the costs of paying suppliers. As we have seen in chapter 5.1, the imposition of an interest rate, even if it is high, will not really affect incentives. As long as budgets of firms are balanced and all SOEs are able to pay workers, arrears do not represent a threat, especially in the absence of effective bankruptcy legislation and in the presence of expectations for a government bail-out. A real penalty on arrears that raises their costs must involve more than just monetary incentives. Rather it has to include a credible commitment by the government not to finance arrears and to impose sanctions on enterprises that keep on running up arrears.

Sanctions could include the replacement of SOE managers or enhancing the initiation of bankruptcy procedures in the case of privatised enterprises. Bankruptcy procedures change incentives in two directions: They threaten the debtor with possible suing, but they also impose a threat on the creditor that extended trade credit to an over-indebted firm has almost no chance of recovery. Therefore firms will also be eager not to have clients falling into arrears with them, so that they will only deliver goods if they are duly paid for. Speaking in terms of the model the variable representing the costs of arrears μ has to be raised over one. According to the equations (18) to (24), enterprises will then have a negative utility by falling into arrears and will therefore decide to pay duly.

As one of the most important aims of macroeconomic policy making is to bring down inflation we will further assume that the imposition of penalties is accompanied by a cut in credit. The rationale for the credit cut is that credit is no longer needed to pay workers when the upstream firm A is paid for the production. The question to analyse is what will happen to the whole system when a credible penalty on arrears is imposed.

- Maximising Utility with Penalties on Arrears -

The mechanism is simple. The intermediate firm B, not willing to accumulate more receivables, will maximise na , also taking into account the change of incentives which lead C to maximise nb too. B will be forced to set producer prices lower, but just as high in order to give C the possibility to pay minimum wages to all its workers, not allowing C to raise a markup. The intermediate firm B will have to pay its workers at least minimum wages. Its ability to raise a new markup (g) on costs is determined by the excess money that remains after having made a payment that covers at least the minimum wages of A. We know from previous analysis, that the money received by the downstream firm is equal to B's and C's minimum wages plus a constant mark-up on B's wages, expressed in equation (48):

$$(48) \quad cw_t + (1 + \beta)bw_t = xCPI_t$$

On the other hand, to continue with full production, workers of all production steps have to be paid at least minimum wages. To see whether production cannot fully continue or whether B will be able to raise a markup, we have to consider the relation between the value of the cash receipts and the sum of all minimal wages.

$$(46) \quad aw_t + bw_t + cw_t \stackrel{?}{\geq} cw_t + (1 + \beta)bw_t, \quad \text{which can be reduced to:}$$

$$(47) \quad a \stackrel{?}{\geq} \beta b$$

We can now derive the following cases:

If $a < \beta b$ then B will be able to raise a markup g amounting to $g = \beta b - a$.

If $a > \beta b$ then B will not have enough money to pay A and $g = 0$.

- Macroeconomic Consequences -

In the former case, production will continue, inflation will stop as well as the accumulation of arrears. Unfortunately this scenario is rather improbable because B's markup is unlikely to exceed the number of workers in the upstream firm.

In the latter case, where B will not have enough money to pay for A's deliveries, A will react by just shipping the amount of goods B can pay for, which is exactly $\beta b/a$ times smaller than the original amount. As inputs are essential for final production, it will be reduced in the same way so that final output becomes:

$$(88) \quad x_{t+1} = \frac{\beta b}{a} x_t, \quad \text{where } x \text{ is effectively } x_t = x_0 = x.$$

To analyse the further development of output and inflation it is convenient to introduce a variable κ which demonstrates the relation of actual output to the initial full employment output. By equation (88) we have seen, that:

$$\kappa_t = 1 \quad \text{and that} \quad \kappa_{t+1} = \frac{\beta b}{a}.$$

The evolution of κ is determined by the following equations:

$$(89) \quad x_{t+2}CPI_{t+2} = \kappa_{t+1}x_{t+1}CPI_{t+2} = \kappa_{t+1}aw_{t+1} + bw_{t+1} + cw_{t+1}$$

$$(90) \quad \kappa_{t+2}aw_{t+2} + bw_{t+2} + cw_{t+2} = x_{t+2}CPI_{t+2} = \kappa_{t+1}x_{t+1}CPI_{t+1}$$

Equation (89) describes the balance between the turnover of the economy (left hand side) and the wages paid to workers (right hand side). The quantity of final products is determined by the amount of raw material the intermediate firm B could afford to pay, so that κ_{t+1} can be found on both sides of the equation (89). In an

environment with downwardly rigid prices and immediately adapting wages to inflation, money will be lacking to make payments to upstream firms. This will cause a slowdown of production, which under the condition of a constant money supply causes inflation to rise. Equation (90) describes the process of how the receipts from final sales (right hand side) will be paid for (in the meantime) inflation-adapted wages. κ_{T+2} shows is the proportion of factual to required (for full output) payments made to the upstream firm A. In the next period it will again determine the quantity of final products, i.e. the proportion of factual to full-employment output.

The equation (90) can be transformed into the difference equation (91) and subsequently solved to become (92):

$$(91) \quad \kappa_{T+2} = \kappa_{T+1} \left(\frac{x \text{CPI}_T}{a w_T} \right) - \left(\frac{b+c}{a} \right) \quad \text{with} \quad \frac{\text{CPI}_{T+2}}{w_{T+2}} = \frac{\text{CPI}_T}{w_T}$$

$$(92) \quad \kappa_{T+t} = \left(\frac{x \text{CPI}_T}{a w_T} \right)^t \left[\kappa_T - \frac{b w_T + c w_T}{x \text{CPI}_T - a w_T} \right] + \left(\frac{b w_T + c w_T}{x \text{CPI}_T - a w_T} \right)$$

In equation (92) the first term on the right hand side is positive and always greater than one, so that it will show an explosive time path. The last term is also positive and greater than one. As κ_T equals one, the second parenthesis is negative, so that the overall development of κ_{T+t} will show an implosive time path, asymptotically tending to 0, when t becomes indefinite.³⁸⁾

By combining the equations (89) and (90) we find:

$$(93) \quad \kappa_{T+2} x \text{CPI}_{T+3} = \kappa_{T+1} x \text{CPI}_{T+2}$$

which can be transferred into the following general form:

$$(94) \quad \text{CPI}_{T+i+2} = \frac{\kappa_{T+i}}{\kappa_{T+i+1}} \text{CPI}_{T+i+1}$$

As we know that κ implodes, we conclude that the inflation rate takes an exactly inverse time path and that it will increase explosively.

The conclusions from the analysis of this policy variant are quite radical but they elucidate a mechanism that has surely played an important role in the very turbulent early phase of transformation. Although the assumptions are very strong, it explains most of the stylised facts of this phase: mushrooming inter-enterprise arrears with inflation before the attempt to stabilise the economy and the sharp decline of output and high inflation thereafter. As the model leaves no space for private sector development, entrepreneurial adjustment or learning from past

³⁸⁾ It can easily be shown, that κ will never be zero by setting κ equals zero and trying to find the time t. This check will resort to a negative ln which does not exist by definition.

mistakes, the results can only partly be true. But they nevertheless indicate, why managers of SOEs in the CIS kept on complaining about not enough money being in the economy and why in some branches output fell to a minimum.

6.2 An Integral Approach to Reform

The analysis of all different policy measures has not shown any satisfying results in terms of a halt in the accumulation of arrears and a simultaneous stabilisation of inflation and output. The lack of success is due to two factors that have not been taken into consideration. The first is that policy only consisted in the application of isolated measures, without using an appropriate policy mix. The second is that measures have not been aimed at the crucial points that lie at the origin of the upsurge of arrears. In this chapter an integral approach is used, which does both: use a policy mix of various different measures and aim at the core of the problem.

What is the core of the problem? The poor legal framework and the even poorer possibilities of enforcing property rights is a major reason for missing threats to enterprises that build up arrears towards others. The congruent incentives of workers and managers cause a missing orientation towards a profit-maximising behaviour. Lack of competition gives enterprises enormous market power, but on the other hand leave them with no choice between various clients or suppliers. Bankers' poor skills and missing incentives as well as the large share of directed credits to enterprises, channelled through banks by policy-makers poses another large problem for monetary control. The underdevelopment of financial markets is the last and maybe most important problem that transition economies face in general. It becomes immediately clear that there is no simple clear-cut solution to the problem. Rather an elaborate plan has to be designed to attack all the incentive and institutional problems of the post-Soviet economy. It will have to describe a path usually referred to as "the economic transition from central planning to the market". This path will only be outlined briefly in this chapter.

- The Legal Framework -

A law on bankruptcy is desperately needed in transition economies to effectively impose a threat on managers that either have ruined their firms or that ruin the firms of others by not paying. It makes non-profit-maximising behaviour more costly, because it punishes permanent illiquidity. Keeping the firm liquid will therefore have a higher priority, so that paying wages will not be the only priority anymore. Although showing a balanced budget, managers will face the danger of being dragged into court and being fired by enterprise owners (probably the state) who will see the firms claims being downsized relative to liabilities,³⁹⁾ with its net value becoming negative. Another advantage of bankruptcy procedures and subsequent liquidation is that it constitutes an effective means of reallocating

³⁹⁾ In Kazakstan, for example, when a bankruptcy procedure is initiated, claims are set at half their nominal value.

resources to the most efficient uses, which is one of the basic problems in the transition process.

A law is a necessary but not a sufficient condition for the effective working of bankruptcy procedures. The law has to be simple and comprehensive. Lawyers have to be trained in the matter to assure a quick working out of cases. Courts have to be multiplied in order to have the huge amount of cases be treated. Besides the development of the whole legal infrastructure, the most important condition for the working of bankruptcy laws is that the government has to make a credible commitment toward tolerating the implementation of strong-handed measures against bankrupt firms.⁴⁰⁾

There are a whole range of other laws that have to be enacted that constitute other parts of the jigsaw puzzle of a market infrastructure. In order to secure extended credit, liens have to be established and collateral has to be registered. All these institutions will help to clarify property rights.

- Privatisation -

An argument that is always put forward against the initiation of bankruptcy procedures puts emphasis on the fact that mostly debtor and creditor are owned by the state, and that the state cannot sue itself. This argument disregards the fact that most enterprises have become legal entities by their being destatified and can and should therefore be treated as independent bodies to impose discipline on managers. Furthermore bankruptcy procedures allow for a liberation of the SOE from indebtedness and subsequent privatisation of the most attractive assets.

Quick privatisation is the policy that is most desperately needed in transition economies to make people assume responsibility for assets. Owners will have incentives to exert pressure on managers, or owner-managers will have incentives to lead their firm according to profit-maximising principles. The interests of managers and workers will no longer be the same, so that pressure for higher or inflation-adjusted wages will be controlled. Privatisation has to be designed in order leave the control of the firm to outsiders. Privatisation will also drastically reduce any expectations of managers for a government bailout.

- Competition Policy -

The monopolist structure of the post-Soviet economies leads to considerable mutual dependence of firms to each other. This dependence ties enterprises to each other's (financial) destiny and leaves them with no choice for the purchasing of inputs and the sale of output. On the other hand it gives enterprises considerable market power which can be used to impose higher prices.

Competition policy is therefore needed to control enterprises. To allow for the market entry of new firms and to spur development of small and medium sized

⁴⁰⁾ In the past this has been the most important reason why bankruptcy laws did not work.

enterprises could help to make some competition possible. Because of the lack of capital and know-how this would be unlikely to be sufficient. The break-up of large combines into different sub-units or control by an anti-monopoly committee could lead to more competition too, although in an environment with scarce financial information it will be hard for regulators to detect the real costs of firms or to separate production lines without eliminating economies of scale or scope.

A necessary supplement to the above approaches would be to liberalise external trade, both on the markets for consumption and investment goods. The influx of consumer goods would help to control consumer prices, and it would also create some external market pressure for producer prices and prices of raw materials. In addition it would enable firms to market their products to foreign countries in exchange for cash. This possibility will impose a threat to clients who are in need of the production and will exert pressures on them to make due payments.

It is true that a sudden liberalisation of external markets will put strain on the whole economy and overestimates the abilities of producers and clients to adapt to changing conditions. This strain itself can in the short-term lead to economic disruptions such as the accumulation of arrears or the piling up of inventories. Policy-makers will have to be aware of slowness of economic change.

- The Banking Industry -

The banking sector will have to undergo a transition from passive accommodation to active allocation of credit to the most profitable projects with preliminary and subsequent audit and control. In most transition countries the first step of banking reform has been the disintegration of the monobank system into a two-tiered banking system. On the one hand commercial banks need to be separated from economic decision-makers to prevent them from being influenced by politics. On the other hand, effective banking supervision can only be exerted if interests of the central bank and commercial banks are disentangled. Third the monetary authority itself must gain independence in order to be resistant to political pressures for the extension of credit or a general bailout.

Supervision by the central bank is only one way to change banks' incentives by imposing outside control. But the real change in the incentive structure must occur inside the banks. Banks will have to be privatised in order to introduce effective owner-control. Ownership itself should be diversified to prevent large shareholders from pressuring for the extension of credit to themselves. Banks will have to diversify their portfolio to make the bank less dependent on large loss-making clients by reducing their importance for the bank's portfolio. A last incentive problem arises from the large bad loan portfolios. These should be removed, like the former management, when the bank is to be privatised.

One of the biggest problems in post-Soviet economies is not only the lack of financial information, the consequence of which is the desperate need for an

economy-wide auditing effort, which is likely to cost precious time and money. The real issue is the fact that few people know how to deal with the available financial information. In the model we have included the lack of financial information and education by introducing the assumption that banks (and enterprises) extend credit as long as the simple balanced-budget constraint of the debtor holds. Know-how transfer is what is needed most in the banking sector. Good education needs again competitive compensation in order to avoid corruption.

- Financial Markets -

Reform also has to be extended to financial markets. The procedures that precede the extension of credit can of course constitute an effective device to control the performance of enterprises. The lion's share of the control task has to be performed by the owners, i.e. in most cases the shareholders. If strategic investors, i.e. majority shareholders, take an active role in the supervision of enterprises, effective corporate governance can be exerted. If ownership is diversified, corporate governance can be exerted by the stock market via the price of shares. If managers make mistakes, they face a drop in the price of shares and therefore an unfriendly takeover that will replace them. For these mechanisms to work, a well functioning and very liquid stock market is needed. Furthermore, the development of institutional and strategic investors, such as investment and pension funds, has to be fostered.

Liquid and transparent capital markets are also needed to help illiquid creditors to get rid of their bad loan portfolios. This can be done by securitising arrears and selling them at a discount rate. On the one hand this will improve the financial positions of creditors. On the other hand the buyer will have the possibility to acquire large stakes in a debtor-firm in order to control it and to force a debt-for-equity swap.

Clearly the banking and financial sector reforms will need much time and considerable domestic and foreign resources. The completion of these reforms should be viewed as a vision. In the meantime a realistic short-term programme should be adopted in order to alleviate the inflationary pressure without incurring large output losses. This approach will be presented in the next section.

6.3 A Realistic Short-term Approach

The following points are parts of a short-term programme, designed to check inflation and arrears accumulation at the same time, while safeguarding full-employment output. It takes account of the fact that institutional changes need a long time to be implemented and to develop.

A Credible Commitment to Keep Financial Discipline -

Neither bankruptcy laws nor the legal infrastructure can be developed fast enough to impose an effective sanctioning mechanism against all enterprises without financial discipline. Governments should nonetheless be credibly committed to crack down on these enterprises. This could be achieved by a publicly discussed and transparently implemented law case, where a major firm should be treated and liquidated. This can be expected to threaten off managers of SOEs, because they face a real danger of being dragged to court and replaced. Therefore just one such case might be needed to radically change incentives of managers.

- Incomes Policies -

In the model, consumer price inflation is assumed to be driven by credit expansion which is needed to keep illiquid firms afloat. Firms are illiquid due to cost inflation, i.e. increasing wages that are again a function of consumer price inflation. This spiral has to be interrupted by cutting the price-wage-link. This can most effectively be done by incomes policies that put a cap on wages and allow only for a moderate increase. Under the strong assumptions made, there is a danger of suppressing demand, which will lead to negative multiplier effects on aggregate supply. This can be avoided by a smooth adaptation of the relevant average wage wt.

- Monetary and Fiscal Policies -

Credit auctions that provide liquidity to commercial banks should be cancelled to keep them tied to a short leash. They will have to reschedule past debts and start to work with their client-debtors. This also forces firms to start working with clients and creates incentives for them to indicate illiquid or bankrupt firms to the government, before they are indicated themselves. Incomes policies will help to avoid the suppression of demand.

As the market forces start to work, the loss-makers and viable firms will be separated subsequently. It may be necessary and also economically sensible to finance the losses for a while before phasing out the subsidies. The subsidies will be transparent and targeted at the firm that makes losses for technological reasons and not because of market structure and lacking incentives. This will constitute a great progress vis-a-vis a situation where subsidies are implicit in credit, intransparent and given to SOEs that are perfectly viable. The first advantage will be to avoid economic dislocation, i.e. the interruption of technological chains. The second advantage will be to keep a high level of output and employment, securing public support for the reform programme. Through the separation of loss-makers and viable firms a "wall of fire" can be built between them to avoid a crowding out of new investments in firms with a perspective in favour of hopeless ones. The financing for the budget has to be provided by the central bank as long as capital markets are not well developed. The monetary expansion needed to cover the losses will be much less than the credit expansion in the early transition phase. Therefore inflation will also be much lower.

- A Rehabilitation Bank -

In order to endorse the endeavour for a credible commitment by politicians and for an effective wall of fire between loss-makers and viable firms a rehabilitation bank can be created. The rehabilitation bank should deal with the biggest loss-making firms and make an effort to restructure and privatise/liquidate them. Being passed over to the rehabilitation bank would constitute a threat to managers. Furthermore taking away the largest loss-makers from commercial banks would reduce their dependence, and it would give a signal to other banks not to finance these enterprises.

- Debt-for-Equity Swaps and Financial-Industrial Groups -

Another short-term measure could be to help creditors transform the inter-enterprise debt turned sour into equity capital. Creditors would start to be co-owners, next to the state, and will have the occasion of pressuring their new subsidiary to pay in time. When the subsidiary is itself illiquid, it can change its own debts for equity and pass on the pressure further downstream. The initial movement would come from the bank of the upstream firm which is the ultimate creditor. Thereby a bank-centred and vertically-integrated structure would develop, which we have come to know as financial-industrial groups (FIGs), now mushrooming in all former Soviet republics.

The role of these conglomerates for industrial restructuring is very ambiguous: The clear advantage is that FIGs can control prices and markups all along the production process. Thereby arrears will be "internalised", so that they will no longer serve as a means of pressure for finance. The second advantage is that the former technological chains are restored and safe-guarded by FIGs. Third, by vertical integration, marketing and transaction costs as well as uncertainty costs are minimised. But there are also a number of disadvantages. The first problem is that these conglomerates will strangulate any up-coming competition. The second is that these conglomerates will in every case constitute units that are "too big to fail", so that they can successfully put pressure on politicians. The third problem is that viable and non-viable enterprises become integrated so that politicians cannot implement a transparent subsidising policy aimed at the real loss-makers.

Although the disadvantages should be taken seriously, the debt-for-equity swap approach with subsequent (automatic) formation of financial-industrial groups can constitute a transitional solution to the inter-enterprise arrears problem. If the conglomerates are not favoured by economic or industrial policy, profitable enterprises will have incentives to break free from it to stop the "taxation" they undergo to finance the loss-makers. In the long-run it will anyway be more favourable to put the emphasis of industrial policy on private and start-up firms and to phase-out subsidies to conglomerates to finally let them die.

7. Conclusions

Although reform measures in the early transition phase in the former Soviet Union were meant to initiate market forces by cutting subsidies and trying to abolish soft-budget-constraints, they resulted in an upsurge of inter-enterprise credit and inflation with continuing output decline. The stunning coincidence of the development of the three aggregates raised questions that can only be answered with considering their theoretical fundamentals: a) how can an originally microeconomic problem like arrears become a macroeconomic problem? and b) what is the inter-relationship of the phenomena? In spite of the introduction of a tight monetary stance, arrears continued to grow and output kept on falling. Increasing inter-enterprise arrears four years after initial reform represent a puzzle to economists because one would expect behavioural patterns to change as experience in the market environment grows. The questions raised were: a) why does the (supposed) transition phenomenon consolidate itself to become a permanent feature? and b) what can be done to deal with it?

Some economists argue that the upsurge of inter-enterprise arrears in the FSU is just a reaction to falling demand caused by the breakdown of external and internal trade because of the collapse of the CMEA and the Soviet Union. Although this is indeed one of the reasons for arrears, it cannot explain the persistence of the arrears accumulation. Others claim that arrears are simply due to corruption and fraud by enterprise managers. This explanation is also not fully satisfying as it neglects the fact that managers of privatised enterprises or even managers of SOEs must have incentives to run their firm successfully in order to remain in office and cannot count on continuing this practice forever. It becomes clear that the incentives structures in the post-Soviet economies must be a little more complex than these explanations suggest.

This paper has therefore made an effort to give a microeconomic explanation of the accumulation of arrears and to analyse their inter-relationship with other macroeconomic aggregates. In addition to that, the impact of distinct policy measures has been derived within the framework of the model. Although the paper takes a very special view by making some quite heroic assumption, the conclusions from our analysis fit quite well into the post-Soviet reality.

Why do arrears continue to increase four years after the start of transition? The historic increase of inter-enterprise arrears stems from the conditions and incentives structures that prevail in the transition phase from a centrally planned to a market economy. These conditions derive 1) from the heritage of the old Soviet system: the monopoly structure and economic rigidities and 2) from the incomplete and inconsequent reforms in the *perestroika* era: the dismantling of the plan and the loosening of state control over SOEs and banks without the introduction of new rules. The transition phase with the starting privatisation added to the above rigidities in the following way: 3) insiders acquired large stakes in SOEs. Therefore SOEs can be assumed to maintain full-employment and to maximise profit per worker, while giving in to pressures from unions in order to set wages that compensate inflationary losses. 4) the prevailing uncertainty and the general lack of financial information forces banks and other creditors to apply the balanced-budget criterion for the extension of credit. 5) due to political pressures, comprehensive laws

on bankruptcy and enforcement procedures are still lacking as well as a commitment by the government to fostering market exit of ill-performing firms.

The results fit perfectly with the stylised facts of the early transition phase when monetary policy stance was quite loose. The inter-relationship between arrears and inflation becomes clear: The presumed "lack of monetary resources in the economy" is a result of cumulative processes initiated by the price jump upon liberalisation. The rising prices are compensated for by higher wages that raise costs. The increasing costs, or in our model producer price inflation, can be imposed on clients because of the rigidity of economic structure (monopolies). The cost increase "wipes out the working capital" held by downstream firms. However the "lack of money" cannot be alleviated by additional liquidity. The continuing easy access to credit does not change microeconomic incentives: rather it provides the scope for the continuing accumulation of arrears. Accumulation of (nominal) arrears and inflation caused by liquidity injection go hand-in-hand.

The conclusion that inflation and the accumulation of arrears are positively correlated leads us to the conjecture that restrictive monetary policy might be able to stop both. Several policies can be thought of to deal with the accumulation of inter-enterprise arrears; some of them have in fact been implemented in post-Soviet economies. The introduction of high interest rates can be one means of imposing monetary restraint. As long as the flows of principal continue, the policy measure will have no impact on the behaviour of SOEs. The higher interest rates will only be reflected in higher producer prices. As the liquidity injection does not increase, consumer price inflation will be constant. Arrears will therefore also accumulate in real terms. This was the situation of Russia in 1994, when as a consequence of positive real interest rates arrears started to rise in real terms. The result is that the imposition of positive interest rates makes the so called *stock problem* of arrears more virulent. While before the stock of arrears was constantly devaluated and therefore did not pose any problem, the growing real indebtedness will now undermine privatisation efforts and thereby become a real threat for the economy.

Turning to the reduction of credit expansion, inflation will effectively stop upon the initiation of the credit cut. As the incentives of downstream firms, which continue to receive cash, have not changed, the upstream firms will not have any money to pay workers. The burden of being a net creditor will pass on from banks to upstream workers. Inter-enterprise and wage arrears will keep on rising in nominal and in real terms. This is similar to the situation in Russian Primorye and in Kazakstan in 1996: in some oblasts workers haven't received any wages for 9 months. However, sooner or later workers will act and they can be expected to blame the situation not on the own nominally viable firm (balanced budget), but on the government. Their accusations will surely be successful.

Putting a complete ban on trade credit extension will bring the whole economy to an immediate halt. The passage from a trade credit economy to a cash-in-advance economy will keep enterprises locked without any supplies, unless large inventories can provide a cushion all along the production chain. Unfortunately in some industries, incidents and uncertainty have led to expectations that have induced managers to demand prepayment. In many cases this has reduced production to a minimum.

From the previous paragraphs it has become clear that isolated macroeconomic policy measures will have adverse effects. The result is that inflation

and (real) inter-enterprise arrears are negatively correlated. Although the result seems to contradict our previous results at first sight, the correlation becomes clear looking at its underlying factor. Loose monetary policy gives nominal arrears the scope to grow, although real arrears will remain constant due to continuing inflation. Tight monetary policy will lead to an upsurge of real arrears while inflation will stop.

But even in case the imposition of an effective penalty on arrears (for example the enactment of bankruptcy procedures) changes incentives effectively, there is a high probability that output will collapse. If the consequence of an effective penalty is, that firms will ship only as many products as will be paid for, a partial payment by one firm of the production chain will reduce absolute aggregate supply. The partial payment can be caused by illiquidity due to wage rigidities along the chain. While money supply is assumed to be constant, the reduction of supply will increase prices inducing workers to compensate it with a wage increase. The consequence will be a vicious circle of rising prices and wages with output spiralling down.

It becomes clear that each of the above scenarios result in radical responses of economic variables which have not been observed in the post-Soviet reality. It is true though that each result represents part of the solution. In an economy where a) credit markets are still segmented, i.e. different firms in different branches have not an equally easy access to bank credit, where b) there are little dependencies between branches (technological chains) and where c) different managers react differently to policy changes, we can be able to observe all features at the same time. Presumably one will be able to observe priority sectors such as the agriculture to be financed at very low interest rates, which adds to inflation and the accumulation of arrears. Other sectors with access to high-interest credit will see production continue with arrears sharply accumulating in real terms, shattering all hopes for privatisation. In some industries where the access to credit is cut, wage arrears will accumulate over time. Some of these firms will eventually manage to be bailed out by the government. Other production chains will just stand still because they are facing real hard budget constraints and therefore cannot even pre-finance their production in the short-term. In sectors where due payment is required, the price-wage spiral can also be partly responsible for the decline of output.

The solution to the problem can therefore only be an integral approach that changes the microeconomic incentive structures. This approach must include a large range of measures aimed at the legal base, competition, corporate governance, the banking system and financial markets. As this approach is too ambitious for a short-term programme, quick measures have to be taken in order to bring about a change in behaviour. These measures must include the initiation of (only) one bankruptcy procedure to make a credible commitment, that creditors that do not make an effort to collect their claims will be punished instead of being financed in case of illiquidity. If finance seems unavoidable to hit certain output targets, explicit government subsidies should be given from the budget. In addition to this, the largest loss-makers should be handed over to a rehabilitation bank that isolates the firms from the banking systems and imposes sanctions on embezzlement. An incomes policy should accompany the measures in order to keep costs down. In order to deal with the stock problem, debt-for-equity swap procedures should be enacted to enhance the formation of vertically-integrated structures that impose corporate governance and internalise market pressure to be easier passed on upstream.

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