NOMINAL-REAL TRADEOFFS AND THE EFFECTS OF MONETARY POLICY: THE ROMANIAN EXPERIENCE

*CRISTIAN POPA**

WDI VISITING SCHOLAR

*Deputy Governor, National Bank of Romania, 25 Lipscani St., Bucharest 70421, Romania, tel. (+40-1) 312-4451, fax: (+40-1) 312-6260, email: crispopa@rnc.ro, Cristian.Popa@bnro.ro, cpopa@umich.edu, and Senior Research Fellow, Institute of Economic Forecasting, Romanian Academy. The opinions expressed in the present paper are solely the responsibility of the author, and should not be taken to represent the official views of any institution that he is affiliated with. I thank (without implicating) Andrew Blake, Olivier Blanchard, Daniel Daianu, Emilian Dobrescu, Saul Estrin, János Kornai, John McHale, Albert Park, Jan Svejnar, Cornel Tarhoaca, Garry Young, and seminar participants at the University of Michigan and the NIESR (London) for helpful comments and suggestions on earlier (and partial) drafts of this paper. Any remaining errors and omissions are, of course, my responsibility alone.

Abstract

Due to the persistence of relatively soft budget constraints and poor government credibility, the survival strategy of Romanian state-sector firms means eschewing profit maximization in the short run in favor of insider utility maximization. This takes the form of attempts at both reducing layoffs and minimizing real wage losses on the background of substantial adjustment in real output. Nominal adjustment (especially pricing and arrears) is favored over riskier and more costly real adjustment, since firms are risk-averse in the longer run. From an operational viewpoint, the representative firm's objective becomes that of maximizing liquidity flows subject to constraints regarding labor hoarding, systemic limits to debt default and spontaneous restructuring.

Empirical evidence supports the idea of an inflation-output tradeoff (in terms of variations around trends) where increases in expected inflation and/or expected gross nominal arrears have a significant negative impact on real industrial output, while unexpected inflation (and defaulted debt) exhibits positive but insignificant coefficients. The tradeoff persists even when controlling for demand-side factors. Monetary variables do not appear to cause this tradeoff, but rather seem to be mediating it. Persistence is also much more pronounced in inflation than it is in real output.

Monetary policy measures then tend to have an asymmetric impact: they are likely to affect the nominal side more than the real one; monetary aggregates tend to have a sharp short-run impact compared to the stronger and longer-lasting effects induced with a lag by changes in interest rates; required reserves, because of their lesser political visibility, have for a long period been a more effective instrument of monetary policy management compared to refinancing rates, when the central bank's independence was ambiguous.

Finally, in the context of a specific credit channel fueled both by commercial bank loans and by differential access to defaulted debt, short-term credit to the state sector exhibits adverse selection features compared to loans extended to private-sector firms, with the latter being in the position of net creditor due to the predominance of hard budget constraints. Firm immunity (given by size, political sensitivity of the respective industry, importance as regional employer, etc.) seems to play a large role in the proliferation of financial indiscipline as a repeated game, with large, poorly efficient firms initiating arrears growth and other firms following either voluntarily (due to cost-of-credit differences) or involuntarily (because of a liquidity squeeze).

The policy conclusions point to the limited effectiveness of monetary policy in macrostabilization if structural reforms, privatization, financial discipline and improvements in corporate governance are absent or slow. Institutional reforms at the central bank level (improvements in the independence of the monetary authority, stating price stability as the paramount objective of monetary policy, instituting multi-annual inflation targets in the context of a consistent macro policy mix, etc.) are also examined.

Keywords: asymmetric impact of monetary policy, inflation-output tradeoff, persistence, soft budget constraints, transition, transmission channels

JEL Classification: E51, P22, P31

I. The Inflation-Output Tradeoff and Its Consequences for Monetary Policy

I. 1 The Theoretical Framework: Attempting a Theory of Aggregate Supply under Transition

This paper concerns itself with a positive perspective of monetary policy in the Romanian transition context. It attempts to investigate the effects of monetary policy on the background of a microeconomically underpinned tradeoff between real output, on the one hand, and inflation and interenterprise arrears, on the other. An examination of the behavior of the representative firm is therefore central to the analysis of these microfoundations.

The specifics of the behavior of the representative firm derive both from the weak institutional structure of the Romanian economy (Dobrescu, 1996), as well as from the fact that majority state-owned firms have been corporatized, but are not yet subject to private corporate governance. Given the fact that these firms are dominant in the economy not just in terms of their share in total assets and firm size, but more importantly in terms of behavior, the present paper takes state-owned firms (both commercial companies and *régies autonomes*) as the representative economic agents.

The behavior of state-owned firms does not follow profit maximization as its main objective. The causal factors that lead to this type of incentive distortion are connected to the perpetuation of lax budget constraints.[1] They can be traced to:

- the fuzzy definition of property rights, whose ambiguous structuring (at least from an operational point of view) complicates state control over managerial decisions; the fluidity of these property rights increases with the prospect of privatization (especially when the latter is a slow process leading to diffuse ownership structures), structural adjustment and enforcement of competition;

- principal-agent problems which directly impact on corporate governance (the lack of explicit financial stakes for managers, and the existence of perverse incentive mechanisms which generate collusion between managers and the owner's representatives);

- the predominance of a specific form of incomplete contracts characterized by the relative absence of contractual discipline (mainly due to lack of enforcement);[2]

- the lack of managerial abilities specific to decentralized horizontal coordination and information processing (otherwise said, the bounded rationality of state-owned firm managers, both in terms

---

[1] The following analysis builds on argumentation from Popa (1992, 1994, 1997).

[2] OECD (1993) states that contracts concluded between firms during the first stage of Romania's transition appear to be more statements of intent than binding agreements.

of model specification and of distorted attempts at optimization), which tie in with: (*i*) a relatively rapid pace of systemic transformation by historical standards; (*ii*) the inheritance of command economy coordination and decision-making abilities and the attendant disorganization (Blanchard, 1997) when the requisite framework for exercising these abilities disappears or is radically altered;[3] (*iii*) coordination failures stemming from the ignorance of (second-order or larger) gains from optimization;[4] (*iv*) expectational uncertainty deriving from the pronounced heterogeneity and volatility of forecasts formed by different subgroups of agents; (*v*) last but definitely not least, the dynamic inconsistency of objectives pursued by the representative firm at different time horizons;

- the existence of an informationally non-transparent environment where the relative scarcity of information is compounded by the noise induced through the transition process itself, as well as by persistently high and volatile inflation.

The aforementioned causal factors, along with a balance of power tilted in favor of unionized labor suggests that the incentive structure of the representative firm is that of insider domination. Hence, the importance given to employee utility is considerable, since its maximization is complementary to the attainment of management's own objectives. Therefore, the goals of the representative firm tend to identify with (predominantly short-term) insider utility maximization, and not with profit maximization.[5]

The representative firm's objective problem must also be examined in another two directions: that of time inconsistency and that of the necessary distinction between final objectives and intermediate goals.

In what concerns time inconsistency, in the short run, the representative firm will attempt both to maintain the level of employment from the previous period and to minimize current real wage drops subject to the acceptance of substantial negative real adjustment. In the long run, the representative firm's objective becomes that of ensuring its survival.[6] It is essential to note that the above-

---

[3] Under conditions of vertical coordination associated with the command system, managerial capabilities were correlated with technological aspects, not with bargaining with suppliers and clients. Firms behaved much like institutionalized production functions, relegating the other aspects of firm management in a fully-fledged market economy (strategic, financial and human resource management, alongside of marketing) to practical absence.

[4] These are largely similar to losses from the existence of near-rational behavior (Akerlof and Yellen, 1985).

[5] Given the assumptions of bounded rationality, information asymmetry, and the complementarity between employee and management objectives, it would be more precise to speak about the representative firm satisficing its objectives rather than resorting to straightforward maximization.

[6] The distinction between short- and long-run objectives has not, to my knowledge, been made previously in the transition literature. One example is Perotti, 1996, who states that "state firms are managed by insiders who maximize

mentioned objectives are not consistent. Their intertemporal conflict may be solved by the temporary renunciation of one or the other short-run objectives, which indicates the limited endogenous adjustment capacity of the representative firm when incentive distortions are persistent, and privatization and structural adjustment have yet to achieve critical mass.[7]

In turn, the intertemporal conflict between the representative firm's objectives stems from its changing attitude towards risk. Even in the presence of foreshortened decision-making horizons associated with high discount rates that are motivated by distorted systemic transformation[8] and high inflation, ensuring long-run firm survival means adopting a more prudent attitude, although short-run insider utility maximization is encouraged by the lack of credibility of punitive measures possibly taken by the state or by creditors.

The inflexion point for changing risk aversion is also specifically configured. In the case of Romania's transition, it does not seem to depend on nominal wealth (as in the classic Friedman-Savage interpretation), but is correlated with firm immunity from punitive interventions arising from the state or business partners. The immunity of a given firm depends on its size, the degree of market domination it is able to exert and the negative externalities induced by the eventual reduction of its level of activity; in turn, these depend on the amount of labor it employs (and its monopsony power at a regional level), the bargaining power of its unions, and the political clout it can exert. In a nutshell, firm immunity depends on the distortions the firm commands and is able to exploit in both product as well as factor markets; as a consequence, for a given level of decision-makers' credibility, the immunity of a given firm is positively correlated with the potential degree of relaxation of its budget constraints.

The behavior of the representative firm is stimulated in the presence of persistently high and variable inflation by reduced menu costs (and, more generally, by low nominal adjustment costs), as well as by generalized recourse to markup pricing. From the perspective of the representative agent, the firm's portfolio of adjustments is predominantly nominal, with real adjustments shirked due to their considerable short-run disutility (the costs associated with such adjustments run counter to the achievement of the firm's objectives), the longer-run attainment of their benefits, and their inherent

---

the probability of survival of their firms, less any nonmonetary costs of restructuring" (p. 2).

[7]It should be stressed that, for a long span of time, isolated state decisions regarding (usually partial) firm closure have mainly been motivated by a lack of inputs, with existing capacities entering "conservation". Similarly, layoffs have principally targeted the outer circle of employees (newcomers, younger workers, second wage earners, etc.), while actual insiders have been considerably less affected. Whenever short-term objectives have themselves conflicted, the preferred solution has been that of real wage reductions aimed at achieving employment objectives.

[8]This is persuasively referred to in Munteanu (1994) as "pathological gradualism".

riskiness (which contrasts the firm's relative risk aversion over similar longer time spans).[9]

Last but not least, by favoring nominal over real adjustment, firms also attempt to compensate the higher X-inefficiency associated with substantial declines in real output; they do so by charging higher prices and/or resorting to markup increases. This is facilitated by the existence of numerous monopolistic niches occupied by Romanian state-owned firms as a result of the industry structure favored by a hypercentralized and autarkic command system.[10] Moreover, the changeover from accommodative financing under socialist planning to a more restrictive system has left firms relatively undercapitalized, thereby placing further constraints on the amount of positive real adjustment that may be achieved through retained earnings (especially when profits are divested in order to maximize insider utility).

From the second perspective, that of the distinction between final objectives and intermediate goals, insider utility maximization is the final short-term objective for the representative firm. It is, however, achieved indirectly, by fulfilling an intermediate goal amounting to the (equally short-run) maximization of the firm's liquidity flows. It is obvious that attaining the intermediate goal (as operational objective for the representative firm) is consistent both with management objectives as well as with employees' demands because it represents a precondition for the appropriation and subsequent dissipation of these liquidity flows into rents. Secondly, it reinforces the nominal bias present in firms' portfolio of adjustments, since liquidity flow smoothing (as a minimal, "satisficing" version of liquidity flow maximization) entails the compensation of income decreases resulting from reductions in real activity (or from continuing to produce with no demand) through price hikes, arrears, obtaining subsidies and transfers (including fresh non-performing loans granted by commercial banks), given the specific conditions under which the firm operates and the level of immunity it benefits from.

Price increases play several roles in this context: in the case of saleable goods, they directly cover liquidity losses engendered by reductions in real output; price hikes also reflect the uncertainty of cashing certain claims, the increased markups employed by firms thus reflecting the maximization of liquidity flows with each successfully cashed claim. In what concerns unsaleable goods, price

---

[9]A similar approach valid for fully-fledged market economies can be found in Greenwald and Stiglitz, 1989.

[10]Traditionally, enterprises in command economies were concerned with the minimization of efforts needed to attain the quantity objectives dictated at the central level. During the initial stage of transition, the coordination problem facing firms is represented by choosing from the multiplicity of available price-quantity combinations that pair which best allows for insider utility maximization with the least effort involved. Firm preference for nominal adjustments as dominant strategy derives not only from the severe discounting of any benefit that would materialize beyond the foreshortened decision-making horizons, but also from the relatively frequent aggregate supply shocks that arise during this period and which increase the relative riskiness of real adjustments.

increases represent a strategic option vis-à-vis the collusion between debtor and creditor firms, where creditors accept the delivery of undemanded goods while covering only part of the invoiced price (the latter amount usually covering wage payments). Last but not least, charging higher prices represents insurance for the representative firm against future liquidity losses arising from higher input costs, especially those that carry rigid budget constraints.

The picture thus far would not be complete, however, without analyzing the actions of the representative firm under uncertainty, as well as the aggregate outcome of these actions.

From the point of view of the representative firm, the initiation of systemic transformation and the disappearance of coordination structures associated with the hierarchical command system have determined a dramatic rise in transaction costs.[11] The problem is complicated in the Romanian case by the presence of additional factors, especially that of barriers to exit due to the non-enforcement of bankruptcy legislation.

Under conditions of a fluid economic environment (especially in what policy attitudes are concerned), of emerging domestic markets, of difficultly forecastable behavior of different subsets of economic agents, and of frequent nominal and real shocks, the attainment of the representative firm's objectives is also conditioned by the minimization of transaction (and, more broadly, adjustment) costs. This takes the concrete shape of adopting heuristic rules and decision-making mechanisms that exhibit little correlation with optimization based on direct observation and interpretation of information available in the firm's environment. Their essence resides in maintaining traditional business relationships and imitating peer decisions (whether peers are considered to be competitors, suppliers, clients or firms active in completely different industries).

Given the specific conditions under which the firm operates, the recourse to heuristic rules appears as a rational option due to the costliness of monitoring and interpreting the information contained in a rather broad set of economic variables.[12] Resorting to a "tried and true" alternative appears to be the preferred choice of firms, primarily because of the increased predictability it entails.[13]

---

[11] It is useful to stress the fact that, for the representative firm, systemic transformation is initially associated with an elevated level of noise that affects the short-run informational efficiency of new signals generated by emerging domestic markets. See also Kornai, 1995.

[12] The recourse to standardized decision-making rules can be not only rational, but efficient as well; it contributes to the minimization of both costs generated by searching for and processing information and of costs associated with decision-making *per se*, as well as directly reducing the uncertainty of results that may be generated by the different options available to the firm.

[13] The dramatic increase in adjustment costs referred to previously ties in directly with maintaining traditional business relationships. One of the reasons for this determination lies in the high costs of searching for new customers and/or suppliers (rematching). The lock-in effect is further amplified by the inherited sectoral structure, fraught with competitive distortions, which amounts to firms being parties to implicit long-term contracts, especially in what concerns

When, under transition, the representative firm has a range of alternative contracting choices at its disposal (Williamson, 1993), the nature of its objectives will favor the least risky option.[14] The imitative strategy, as an answer to the imperfect managerial capabilities the firm benefits from, answers this criterion best, since it exploits the decision-makers' lack of credibility through the behavioral solidarity of state-sector firms.

The symmetric evaluation of this response would not be complete without a summary endogenization of government decisions. The lack of a credible separation between the regulatory capabilities of the state and its activity as economic agent (the latter posture suggesting that implicit support is given to majority state-owned firms regardless of its negative efficiency implications) has led to a situation of implicit regulatory capture by redistributive lobbies, the decision-makers delaying comprehensive reforms (and tolerating high inflation, together with financial indiscipline) until the social and political costs of adjustment become smaller than the attendant costs of maintaining the *status quo*.[15] Indeed, the perpetuation of inflation and financial indiscipline have until recently been tolerated in Romania as passive alternatives to socially unpopular (and therefore politically risky) drastic reform measures, especially when they were able to make a short-run contribution to deficit financing or to maintaining employment in the state sector.[16] When decision-makers are considered in their position of suppliers of institutional change and of regulators of the speed at which systemic transformation takes place, the supply of reform will be dependent (alongside the ubiquitous political motivations) on the objective of maximizing the rents (political

---

the intermediate sector. Moreover, rematching costs are directly linked to the continued production of soft goods.

[14]The representative firm may be described in this context as being incompletely adapted to the market in what its behavior is concerned. The perpetuation of certain inertial characteristics is also a feature of command economy customs, where attaining the given quantity objectives was done according to the least effort principle. Perversely, this has transferred into the representative firm under transition usually ignoring the option of endogenous restructuring and preferring risk minimization instead. This is the underlying reason for which I speak about satisficing rather that unconstrained optimization of the proposed objectives at firm level. The representative firm may be more accurately described as attempting to fulfil its chosen objectives via a minimum risk path, rather than trying to maximize its liquidity flow for an acceptable level of risk. This latter perspective presents the firm as being more concerned with survival (together with other firms in its sector) including through the adoption of perverse responses and resisting adjustment than with individual (even short-term) optimization.

[15]In this sense, see Alesina and Drazen, 1991; Velasco, 1993; Drazen, 1996; Lopez Murphy and Sturzenegger, 1996.

[16]I am indebted to discussions with Andrew Blake for the idea that, although macroeconomic policy in Romania appears time-inconsistent in its attitude toward stabilization, it has actually (given the poor credibility of relevant decision-makers) been consistent in achieving high or moderate inflation. Endogenizing government decision-making reveals a situation akin to the existence of an expectation trap (Chari, Christiano and Eichenbaum, 1996), where corporate sector expectations of high inflation and of persistent financial indiscipline will be validated by the authorities if the cost of avoiding such outcomes is generating (or deepening) a recession or the political equivalent thereof. The analogy is even more germane when the pre-1996 existence of important quasi-fiscal deficits is taken into account.

and otherwise) that may be extracted by influencing the dynamics of transformation, namely its deterministic component.

From the viewpoint of the representative firm, the rationality of the collective stance adopted by state-sector firms resides in minimizing the probability of punitive intervention through the generalization of adjustment-resisting (and market-avoiding) behavior that violates the imposition of hard budget constraints at the level of a broad subgroup of economic agents, including those with high immunity. The generalization of such behavior, by exploiting strategic complementarities, redistributes the risk of punitive intervention away from the new entrant and across the entire set of collusive firms.[17]

It is worthwhile to examine the *status quo* option in more detail from the viewpoint of financial indiscipline; this is indissolubly linked to the dynamics of real output and aggregate prices by dint of its employment as an instrument geared towards attaining the operational objective of the firm. Thus, the firm maintains its traditional business relationships both due to the costliness of rematching and to the existence of collusion between debtors and creditors. The latter is generated by the dominant market positions of firms (where their monopoly advantages are confronted with symmetric monopsony positions for clients) and by the hypertrophy of chains of production in the intermediate sector (Daianu, 1996), as a special consequence of Romania's previous autarkic development.

Because of firm solidarity engendered by the lack of credibility of decision-makers (Rostowski, 1993), creditor firms will tolerate non-payment (or partial payment) on behalf of their debtors due to the large implicit stake they have in the continued functioning of the latter category of firms (Petersen and Rajan, 1996), the difficulty in estimating the creditworthiness of business partners under persistent financial indiscipline, the relative ineffectiveness of individual actions aimed at unilaterally instituting financial discipline,[18] and, not least, the short-run Nash equilibrium character of financial indiscipline, where deviating from arrears generation is not rational for the individual

---

[17]This is the central message derived from the analyses of financial indiscipline in Popa, 1994 and Perotti, 1995, 1996.

[18]Indeed, the net worth of a firm which finds itself in an arrears circuit becomes uncertain, since it depends on the value of receivables in arrears and these, in turn, depend on the arrears that confront all its debtor firms (Perotti, 1995). In what concerns the ineffectiveness of unilateral efforts aimed at financial discipline, cash-in-advance constraints are employed on a limited scale (given the emphasis on traditional customer relationships and the symmetry of such actions which, if retaliated with, tend to eliminate the liquidity advantages of resorting to arrears financing), while seizing assets presents the problem of sectoral specificity, along with that of the difficulties of trading highly depreciated assets when specialized markets are absent and the capital market is underdeveloped. Finally, bankruptcy or liquidation, besides the same problems as in the case of asset seizure, also present the disadvantage of running counter to the idea of maintaining traditional business relationships when net worth is uncertain and possibly threatening the long-run survival of the creditor firm itself.

firm, since observing financial discipline under imperfect credibility is associated with net losses because of the net creditor position in which the "law-abiding" firm finds itself. The disciplined firm thus becomes a source for income (and liquidity) transfers to firms with lax budget constraints, which directly affects the realization of firm objectives in both the short and medium run.

The alternative to maintaining traditional business relationships takes the shape of a specific export drive (Croitoru, 1994, Popa, 1994, Daianu, 1996) that is meant to exploit the benefits of trading on foreign markets: the transparence and predictability of regulations and institutional arrangements, the relative stability of the respective macroeconomic environment, transacting in hard currencies (which is domestically equivalent to conducting business with indexed nominal contracts), the existence of informational transparency (allowing for undistorted price signals, the possibility of assessing the standing of partner firms through capital market performance, and the positive signal sent by the continued presence of a partner firm regarding its solvency) and, most importantly, the absence of payments arrears and the relatively small size (and short maturity) of commercial credit. It is worth noting that the specific export drive is generated by firms' desire to avoid the domestic macro environment affected by persistent financial indiscipline and, similarly to the *status quo* option, is also motivated by attempts at minimizing transactions costs, reducing uncertainty, and liquidity flow smoothing. As such, lower foreign prices associated with the increased export flows induced by the persistence of domestic financial indiscipline reflect both a liquidity premium and (before the forex market was liberalized) the gap between official and gray market exchange rates.

Of course, the alternatives are not perfect substitutes, because of the necessary distinction between the salability of hard and soft goods, and because of the asymmetric experience, know-how and information necessary for a successful evasion from the domestic market. This segmentation makes the two options coexist.

From a dynamic (i. e. repeated game) viewpoint, the coordination problem for persistent financial indiscipline becomes that of a Stackelberg equilibrium between firms who initiate arrears and followers. Leader firms, due to their poorer efficiency and higher immunity, create arrears in repeated games in order to meet liquidity debt under conditions of borderline insolvency. Follower firms align themselves to the arrears positions set by leaders both involuntarily, due to a growing stock of receivables in arrears, and voluntarily, due to the positive transfers that may be obtained from creditor firms, as well as to cost of credit considerations (even if bank credit carries negative real interest, arrears present an even lower cost, since they carry nil nominal interest and are also free from the collateral, information and monitoring requirements that come with official borrowing). More importantly, follower firms align their positions with those set by the arrears leaders in order to minimize the risk of punitive interventions, solidarity with other financially undisciplined agents leading to firms' acquiring insurance which offsets the losses from the equilibrium level of arrears

exceeding the optimal level.

The result of coordination in such a context (where imitating peer decisions and maintaining traditional business relationships play a major role) is that firms converge in the short run to certain levels of arrears (defined at an industry level by their immunity or lack thereof, their size, the sectoral competitiveness including external pressure, etc.) which are then updated through time. Besides imitation, coordination *per se* takes place *via* setting the level of arrears payments as a function of receivables in arrears, as well as through price increases which reflect cost pressures arising from suppliers' pricing dynamics, adaptive inflationary expectations, and expected exchange rate depreciation (given a generalized dentist effect).

Liquidity flow smoothing at the representative firm level requires the active use of price increases and arrears generation in order to compensate reductions in the level of real economic activity. In periods of high inflation, price hikes and increases in the stock of arrears are complementary in smoothing nominal income flows, whereas in low inflation regimes they tend to act as substitutes, with financial indiscipline taking on part of the nominal adjustment that was effected in the past through changes in prices.

The complementarity between price and arrears increases is influenced by the representative firm's time preference in what concerns the employment of these instruments. In the short run, the preferred instrument is an increase in the stock of arrears, given its ease of use and lower visibility compared to price hikes; the latter become dominant over longer time spans, also because of low but nonzero menu costs.

Arrears are not perfect substitutes for credit to nongovernment. Instead, they behave as a buffer stock in accommodating unanticipated adjustments, while also being aimed at reducing transactions costs through the use of spontaneously generated inside money (King and Plosser, 1984; Chari, Christiano and Eichenbaum, 1995; Daianu, 1996). Since arrears are not employed individually, but interact instead with other instruments available to the firm in order to achieve liquidity flow smoothing, the variance of nominal arrears will also reflect the impact of these other factors, over and above the impact of rationing or of more costly external finance that the firm is faced with.

Even if persistent financial indiscipline represents a rational short-run option for the representative firm (the second-best nature of such an option exhibiting a larger than optimal stock of arrears that is counterbalanced by the implicit insurance contracts firms conclude against being singled out for punitive interventions, including liquidation), in the longer run its disadvantages become obvious, as it represents an unstable equilibrium. The initial reduction in transactions costs generated by recourse to arrears financing translates into substantial increases over longer time horizons, due to rising liquidity premia, more frequent cash-in-advance constraints, disruptions in payments, and

growing stocks of receivables in arrears. The resulting higher uncertainty tends to push aggregate supply lower than its steady-state level in the absence of financial indiscipline. The inflation-output tradeoff itself exhibits diminishing returns, firms' preference for nominal adjustment and the attendant compensation of lower levels of real output having to be effected through progressively larger price increases, which exert obvious effects on the inflationary regime, domestic money demand and systemic uncertainty.

The proliferation of arrears under high and variable inflation rates can thus lead to spontaneous adjustment on behalf of the firm when the relative costs of nominal adjustment are higher than the attendant benefits. This may take diverse forms, ranging from differential approaches to business partners that have been classified according to their creditworthiness (business with repeat offenders being conducted strictly on a cash basis) to relatively small real adjustments. The above features are, however, substantially different from the spontaneous adjustment that takes place with hard budget constraints and better credibility (Pinto, Belka and Krajewski, 1993; Pinto and van Wijnbergen, 1995). Since the representative firm's perspective is a survival one: with low decision-making credibility, it will mainly resort to market-avoiding adjustments (either by reducing e level of real output or by continuing to produce without demand) whenever budget constraints undergo a relaxation and firms can successfully employ other sources than their own productive activity in order to smooth liquidity flows. The similarity with accommodative financing under the command economy system is thus obvious.

I. 2 Empirical Evidence in Support of the Inflation-Output Tradeoff Hypothesis

The inflation-output tradeoff is amenable to comprehensive econometric verification.[19] First, the hypothesis of liquidity flow smoothing as operational objective for the representative firm benefits from empirical support at the aggregate level. Using cointegration analysis for 1991:07- 1995:12 on LNOMY (log monthly nominal industrial output), DLCPI (the first-differenced log monthly price level, as measured by CPI), and LARRS (log monthly nominal gross arrears), all of which are $I(1)$, the Johansen test finds an unique cointegrating relationship that is robust to lag length specification (for 4 to 6 lags). For six lags, with normalized coefficients and including a deterministic linear time trend (standard errors reported in parentheses), this equation is:

---

[19]All data employed in the present paper, unless otherwise noted, come from *National Bank of Romania Monthly Bulletin*, 1991 – 1998; *National Bank of Romania Quarterly Bulletin*, 1991 – 1998; and various PlanEcon, Inc. publications. Computations were performed using EViews 3.x, Microfit 4.0 and Beta 2.10.

$$LNOMY = -8.028903*DLCPI - 0.447997*LARRS - 0.029550*TREND - 1.678908 \quad \text{(1)}$$

$$(2.17512) \qquad\qquad (0.19425) \qquad\qquad (0.01087), \qquad \log L = 236.4847.$$

The negative signs of the coefficients of the inflation rate and arrears variables thus indicate the existence of a unique equilibrium in which price increases and the proliferation of financial indiscipline are associated with reductions in the level of nominal activity; this supports the cash flow smoothing hypothesis at the level of the representative firm. Moreover, using the residual from this cointegrating equation as regressor in an error-correction model that includes all of the above variables in first differences yields a highly significant coefficient (-0.00326, with an attendant p-value of 0.0006). Its relatively small size indicates slow convergence towards equilibrium, which is also consistent with the liquidity flow smoothing hypothesis (this would require *tatônnement*, as opposed to outright maximization) (Appendix 1).

A broader perspective is offered by the empirical estimation of the relationship between the variations around trends of log real industrial output (LY), on one hand, and those of expected (LCPI_E) and lagged unexpected (LCPI_N(-1)) inflation, on the other. [20] I obtain the following results for 1991:01 – 1998:06, which are robust to the detrending method applied.[21]

$$LY_t = -0.103149*LCPI\_E_t + 0.1179645*LCPI\_N_{t-1} + 0.351179*LY_{t-1} + 0.308124*\hat{q}_{t-1} + \hat{q} \quad \text{(2)}$$

$$(-1.755856) \qquad\quad (1.186234) \qquad\qquad (2.041139) \qquad (2.032260),$$

$R^2_A = 0.363370,$ $\qquad \log L = 117.5457$

$DW = 1.947384,$ $\qquad DF = 87$

$F = 17.36211,$ $\qquad p(F) \le 10^{-7}.$[22]

---

[20] Of course, inflationary expectations cannot be observed directly. I resort here to a proxy evaluation by regressing the detrended log CPI price level on its own previous period value and using the resulting adjusted values as a measure of expected inflation; similarly, the residual from this regression is employed as a proxy for unexpected inflation. The use of such an algorithm is motivated both by the presence of adaptive expectations and by the broad recourse of firms to imitative strategies.

[21] Detrending was performed using four methods: deterministic linear trends, linear trends accounting for structural breaks in each of the series, Hodrick-Prescott filtering and stochastic trends.

[22] All variables are in logs and have been detrended *via* the Hodrick-Prescott filter. ε_{t-1} refers to the first-order moving average error correction term. The equation was estimated over 1991:03 – 1998:05 using Newey-West heteroscedasticity and autocorrelation-robust standard errors and covariances (t-statistics in parentheses). The results of estimating similar specifications employing differently detrended variables are reported in Appendix 2. The latter also contains the results for bootstrapping the two equations in which the coefficient of lagged unexpected inflation is statistically significant.

Real industrial output tends to drop below trend when the expected price level rises above this, the result running counter to the usual neutrality that is theoretically assumed for expected inflation (the output-inflation tradeoff also operates in developed market economies, but its microfoundations are radically different than in the Romanian case, in the former group the most ubiquitous explanation resting on price rigidity).[23]. On the other hand, the real positive effect of unexpected inflation conforms to standard macroeconomic theory (Lucas, 1972, 1973), but its impact is not statistically significant. Artificially expanding the sample through bootstrapping shows that, although the coefficient of expected inflation stays largely the same in terms of magnitude and significance, the one of unexpected inflation becomes even less significant than it was initially (Appendix 2).

The nominal-real tradeoff is more evident when the expected and unexpected components of detrended log nominal gross arrears are taken into account alongside inflation. The following estimates obtain for 1991:03 – 1995:05:[24]

$$LY_t = -0.9541264*LARRS\_E_t + 0.1979756*LARRS\_N_{t-1} - 0.2409693*LCPI\_E_t + \qquad (3)$$
$$(-2.638452) \qquad (2.309999) \qquad (-1.927663)^{**}$$
$$+ 0.4376771*LCPI\_N_{t-1} + 0.8125567*\mathring{q}_{t-1} + \mathring{q}$$
$$(2.436096) \qquad (9.955382)^{*}$$

$R^2_A = 0.711509,$ $logL = 69.17426$

$DW = 2.154567,$ $DF = 46$

$F = 31.82892,$ $p(F) = 1.0067*10^{-12}.$

Bootstrapping with 500 replications in this case indicates that the unexpected inflation and unexpected arrears coefficients are both biased upwards by between 83 and 101 percent; correcting the bias is also accompanied by a substantial worsening of their statistical significance, while that of the expected inflation coefficient is improved and shows very little bias, its variation after bootstrapping being only 3% (Appendix 2).

I now turn toward examining whether the nominal-real tradeoff is mainly a supply- or demand-side

---

[23]Since these equations deal with variations around trend for the log price level, the specifications are equivalent to ones including inflation.

[24]The shorter sample for this estimation is due to the absence of monthly or quarterly arrears data after 1995:06. Autocorrelation- and heteroscedasticity-robust standard errors and covariances were employed in this estimation, and t-statistics are provided in parentheses. $LARRS\_E$ and $LARRS\_N$ are the expected and unexpected component of detrended log nominal gross arrears. All other notations as before.

feature. I attempt to clarify this by controlling for major factors of influence on aggregate demand (namely inventory dynamics, exports, and credit to nongovernment).[25] I first perform a regression of real industrial output on these variables, and then use the residual as dependent variable in estimating a tradeoff equation such as (2) in order to see whether expected inflation still has substantial explanatory power. The results are quantified in Appendix 3; they suggest the nominal-real tradeoff is a largely supply-side phenomenon that takes place irrespective of aggregate demand conditions. This would also suggest that firms voluntarily effect the nominal-real tradeoff.

Figure 1

The protracted impact of inflation shocks on real output is also evident from the dynamic multipliers derived from a VAR(6) on monthly real industrial output, the CPI price level, the real exchange rate, real credit to nongovernment, and real ex ante commercial bank lending rates to nonbank clients over the sample 1992:07 – 1998:05 (Appendix 4).[26] Figure 1 depicts the impulse-response function for real output as a consequence of

Response to One S.D. Innovations ± 2 S.E.

Response of LY to LCPI
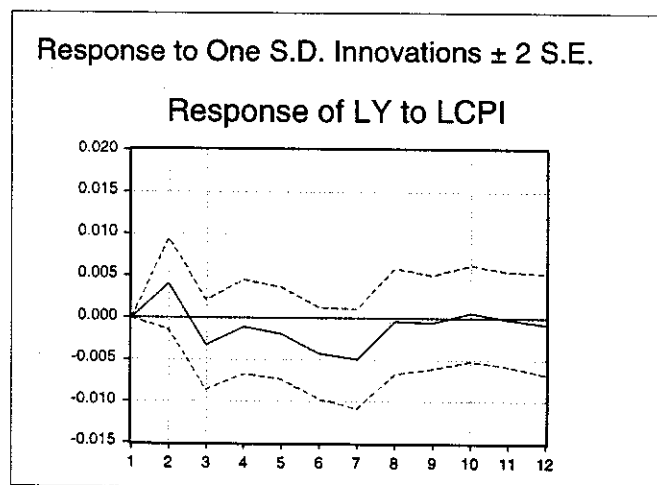
a one standard deviation unexpected increase in the aggregate price level. The expansionary effect of unexpected inflation dies out in less than three months, while output reverts to the steady state after an interval of roughly nine months (longer than the postulated firm decision-making horizon of up to 6 months).

The positive but insignificant coefficient of unexpected inflation indicates the possibility that the representative firm is more preoccupied with the volatility of inflation resulting from shocks than strictly about the level of unexpected inflation. Using a series of GARCH models (including exponential, absolute value, and GARCH in mean) yields ambiguous results: a higher conditional variance of inflation is negatively associated with the variations of real output around trend in all specifications, but its statistical significance is poor, while the signs, magnitudes and significance of the two measures of inflation employed before remain largely unchanged (Appendix 5). Interestingly, the exponential GARCH specification reveals that positive shocks to the variance of

---

[25]Wages were not taken into account among these factors for two reasons: they are highly correlated with inflation and, since I mostly discuss intermediate sector firms, final consumer demand plays a smaller role in this case, given the broader autonomy of this sector within the national economy.

[26]All variables are in logs except the interest rate in percent; all real variables have been deflated with CPI. Exogenous variables in the VAR include an intercept and a deterministic linear trend.

inflation exert a significant negative impact; this is consistent with firms reacting mainly when inflationary expectations end up below actual price level dynamics, with higher than expected price growth treated as a windfall in terms of avoiding frequent adjustments to the level of real output.

In this context, stabilization will take place with damped real costs or may even generate expansionary effects (similar to those detailed for the medium run in Bruno and Easterly, 1995). However, given its microfoundations (which are lacking in both the paper quoted above and in Barro, 1995), the present paper is able to predict that the representative firm will alter its behavior according to the existing inflationary regime: when the buffer of high and variable inflation disappears and budget constraints become more rigid, positive real adjustments become *ceteris paribus* less costly relative to nominal ones, since menu costs increase and are more visible, while persistent financial indiscipline is associated with a higher risk of firm exit.

Until now, the present paper has given empirical evidence regarding the existence of nominal-real tradeoffs in reduced form. It is important to investigate the role of monetary factors vis-à-vis the existence and functioning of this tradeoff. I attempt to do so by estimating the output-inflation equation *via* two-stage least squares, using monetary variables as instruments, and then to test whether the residual still has predictive power and informational content with respect to the employed measures of inflation. I find that the estimated coefficients from this specification conform to the previously identified pattern, with expected inflation exerting a negative and significant influence on real output, while that of unexpected inflation is positive but insignificant at conventional levels (Appendix 6).

Moreover, employing the residual from the above equation in a similar output-inflation tradeoff specification indicates that the two measures of inflation maintain similarly signed (and asymmetrically significant) coefficients as before, although they explain less of the variance of the dependent variable:

$$YMPOL_t = -0.052429*LCPI\_E_t + 0.055935*LCPI\_N_{t-1} + \varepsilon_t \qquad (4)$$

$$(-2.157599) \qquad\qquad (0.339455)$$

$R^2_A = 0.048541,$ $\quad$ $logL = 91.64490$

$DW = 1.776028,$ $\quad$ $DF = 68$

$F = 4.520236,$ $\quad$ $p(F) = 0.037130.$

The residual employed above is also significant in predicting the dynamics of real output over a 12-lag interval (Table 1).

Granger causality tests, 12 lags, 1991:01 - 1997:12   **Table 1**

Null hypothesis	Obs.	F	p(F)
YMPOL does not cause LY	60	2.04722	0.04930
LY does not cause YMPOL	60	1.36089	0.23065

Monetary factors thus play a substantial role in realizing the output-inflation tradeoff, but they do not exhaust the information contained in the short run by the measures of expected and unexpected inflation that I employ. The monetary policy stance (as reflected in both aggregates and real interest rates) is important in explaining the tradeoff in the previous sense of defining a specific inflation regime as well as in terms of the transmission mechanism, but it otherwise appears to mediate in the actual functioning of the tradeoff, and not to play a univocal causal role in this. Keeping in mind the detailed microfoundations presented in the previous section, mediation through monetary variables does not appear to determine, but rather propagate the nominal-real tradeoff, with accelerating inflation due to a lax monetary stance allowing firms to increase prices in the presence of low adjustment costs, thus making nominal adjustments more attractive and less risky than positive real ones.

II. The Effects of Monetary Policy

### II. 1 Empirical Evidence on Tradeoff-Mediated Effects and Persistence

The present section focuses on three issues related to the inflation-output tradeoff discussed before: (*i*) asymmetric nominal and real effects induced by policy instruments; (*ii*) different effects produced by monetary aggregates compared to interest rates; (*iii*) differential persistence in nominal and real variables following systemic shocks. Empirical analysis will mostly be effected through non-structural or semi-structural methods such as VARs, VECMs and Granger causality tests, given changes in behavior under transition and persistent identification problems in terms of evaluating monetary policy (here and elsewhere). Moreover, as Galí (1992) states, impulse-response functions derived from VARs/VECMs will also reflect the effects of any systematic policy reaction to shocks. Due to the relative undercapitalization of firms and the importance of bank credit in external finance, monetary policy effects have a shorter outside lag (for Romania, estimates place it at 3-4 months),

17

while persistent financial indiscipline distorts these effects, skewing them towards the nominal side.

A VAR(12) for 1993:01 – 1997:07 performed on log real industrial output (LY), the log CPI price level (LCPI), the real *ex post* average commercial bank lending rate to non-bank clients (COMB_R_P, in percent, deflated with CPI) and log real broad money (LRM2, deflated with CPI) shows that monetary variables are the most significant explanatory variables for both output and aggregate prices in the short run (6 to 12 months). Over relatively longer spans of time, as a result of the output-inflation tradeoff and of asymmetric persistence in nominal and real variables, the cumulated effect of monetary variables is stronger on prices than on real activity (after 24 months, monetary variables explain 50.67% of real output variance, compared to 54.4% for the price level). Interestingly, the real effects of broad money are felt relatively sharply after a short lag (3-4 months), peaking after 6 months, followed by a pronounced but gradual decrease. By comparison, interest rate

Figure 2
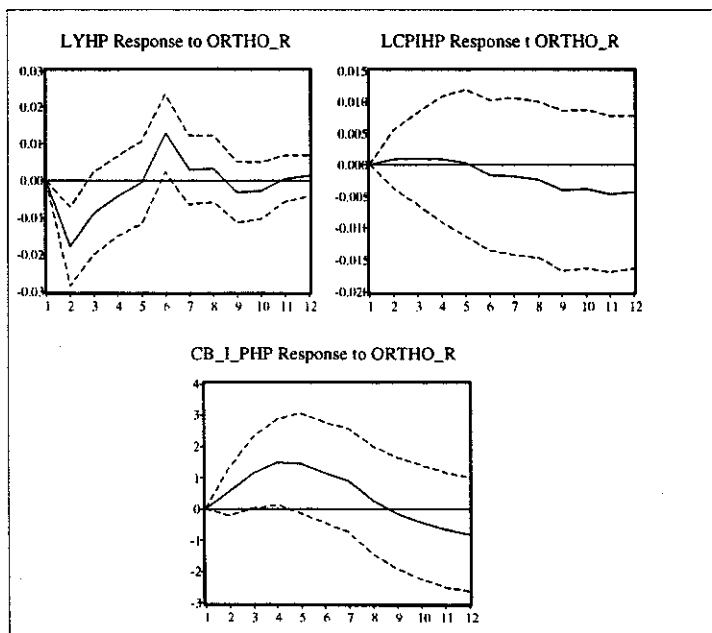
effects on real output are relatively smaller but more sustained: they peak at between 10-18 months but remain strong until the end of the two-year horizon. In what nominal effects are concerned, the impact of interest rates proves stronger and faster than in the case of real output, with substantially weaker real M2 effects conforming to the same time pattern as before (Appendix 7). This suggests that monetary policy transmission *via* a credit channel plays an important role in explaining the dynamics of real output, while cost-of-credit effects are secondary. Also, the presence of the tradeoff exerts a decisive influence on the dichotomous effects induced by interest rates and the money supply: while an increase in interest is contractionary, its impact is moderated by the output-enhancing effects induced by the resulting reduction in inflation. Therefore, a mitigation of stabilization costs appears possible. On the other hand, the impact of accommodation in monetary aggregates is substantial in shaping the way these quantity variables interact with real output.

The above conclusions are supported by results from Granger causality tests on the above variables (detrended by using the Hodrick-Prescott filter). The tests are structured for 2, 6, and 12 monthly lags in order to capture inside and outside lags in monetary policy-making, as well as the more protracted

effects of these policy instruments (Appendix 8). Both interest rates and the money supply appear to bilaterally interact with aggregate prices starting in the very short run, while the monetary aggregate is also significant in predicting output at the 2- and 6-month horizon. Two other striking features are the lack of mutual predictive significance of interest and output over all of the considered horizons, and the strong correlation between quantity and price instruments in monetary policy, which contrasts with their relative independence before 1997.

Romanian monetary policy instruments have effects that are consistent with theoretical predictions. An example are the nominal impulse-responses for monetary policy shocks derived from a VAR(4) on monthly log real industrial output (LY), the log CPI price level (LCPI), real *ex post* commercial bank average lending rates (COMB_R_P) and log real reserve money (LRRSRV) (Appendix 9, for 1995:03 – 1998:06). The decline in inflation following an unexpected increase in real interest is significant and protracted; conversely, the increase in base money as a result of shocking reserves has a persistent inflationary effect (Figure 2).[27] However, the lower short-run magnitude of responses to reserve money shocks compared to interest rate effects

Dynamic Multipliers for Monetary Policy Shocks to Aggregate Prices from VAR(4) on LY, LCPI, COMB_R_P and LRRSRV

Response of LCPI to COMB_R_A

Response of LCPI to LRRSRV

Response to One S.D. Innovations ± 2 S.E.

Figure 4

Variance Decompositions for Real Refinancing Interest and Log Real Reserve Money, 1993:07 - 1997:07

Variance Decomposition of CB_R_P

Variance Decomposition of LRRSRV

LY — CB_R_P
LCPI — LRRSRV

attests that firms (and banks) are more capable of evading quantitative credit restrictions over time, but remain vulnerable over longer runs to the effect of interest rate increases. Also, agents appear to attach a higher credibility to changes in interest; it may be inferred from this that interest rate adjustments are perceived as signaling more persistent changes in the stance of monetary policy than
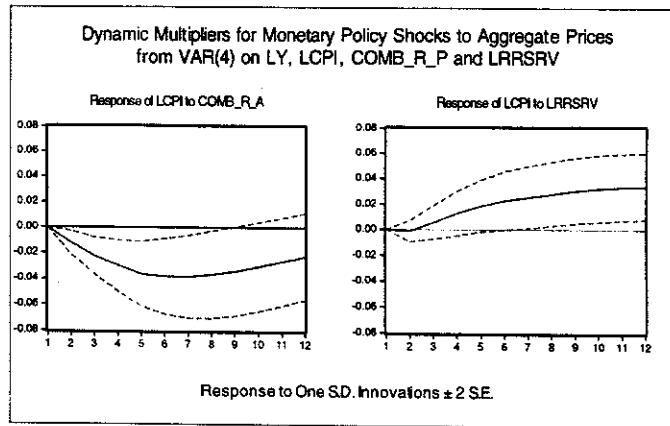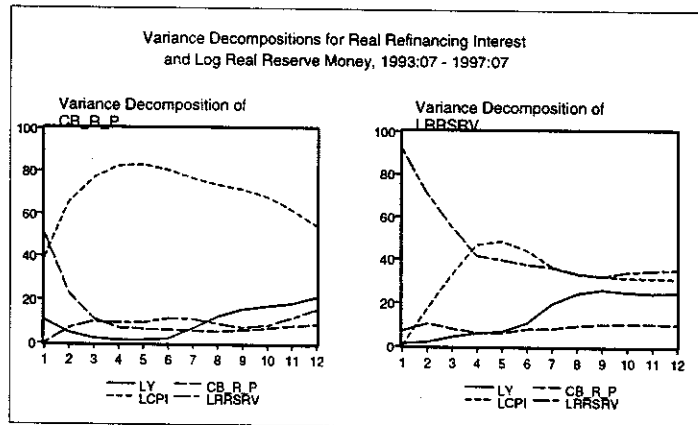
---

[27]Although the National Bank of Romania does not directly control commercial bank lending rates, I found this to be a reasonable proxy for refinancing conditions; since June 1997, the NBR has started using deposit taking (call funds) as a monetary policy instrument, while refinancing has dwindled to almost zero. Using the average refinancing rate would have led in this case not only to sampling problems, but also to biases by neglecting the effects that the net debtor position of the central bank is exerting on the money market. Both reserve money and commercial bank lending rates are deflated by CPI.

changes effected in reserve money (as a result of modified minimum reserve requirements). The emergence of cost-push effects is in turn connected to persistent budget constraint softness, as well as to the imperfect credibility of monetary policymakers.

In this context, reserve requirements play an interesting role. A VAR(6) on real industrial output (LYHP), the CPI price level (LCPIHP), *ex post* nominal average refinancing rates (CB_I_PHP) and the component of real reserve money that is orthogonal to previous values of bank reserves (ORTHO_R) yields dynamic multipliers which suggest that shocks to orthogonal real reserve money (identified herein as arising primarily from unexpected changes in minimum reserve requirements by the central bank) give rise to interest rate effects (the nominal rate increases at first in line with higher prices, declining afterward as the stabilization effects of a tighter monetary policy stance begin to be felt) and are significant in supporting disinflationary efforts (Figure 3 and Appendix 10).[28] The reserve money decomposition is meant to isolate "true" liquidity effects from increases in the demand for money as a result of decreasing interest rates and is consistent with other similar efforts (Strongin, 1992; Bernanke and Mihov, 1995).

If variance decomposition is employed in a VAR(6) on monthly log real industrial output, the log CPI price level, the real *ex post* average refinancing rate and log real reserve money (Appendix 11), it indicates that reserves have stronger exogeneity compared to interest; even after 12 months, the most important factor accounting for reserve money variability are reserves themselves (Figure 4 and Appendix 11).

Figure 5
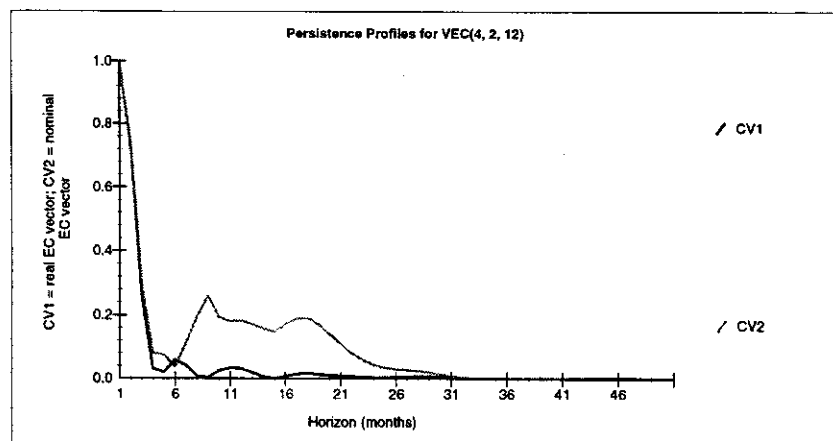
The asymmetry between the nominal and real effects of monetary policy rests on the existence of an inflation-output tradeoff. Firms respond positively to lower uncertainty due to disinflation, and this in turn leads to relatively better market conformance. On the other hand, smaller real effects may also derive from firms initially operating off their supply curves, so that adjustment at first may be effected relatively painlessly by exploiting existing efficiency reserves (Daianu, 1996).

The above discussion raises the issue of differential nominal and real persistence in Romania. Using

---

[28] All variables are in logs (except CB_I_RPHP) and detrended *via* the Hodrick-Prescott filter.

a VECM(4, 2, 6) on LY, LCPI, COMB_R_P and LRM2, the persistence displayed by the two cointegrating equations (CV1 is real, CV2 is nominal) to system-wide shocks (which here are monetary in nature) is presented in Figure 5 (and Appendix 12). Real output reverts to its equilibrium level relatively fast, while the aggregate price level response to shocks is dramatically more protracted, its reversal to the steady-state taking place after about 30 months.

The asymmetry in nominal *vs.* real persistence is also robust to different detrending methods. Applying both parametric (fitting an ARIMA(0, 1, 2) as in Campbell and Mankiw, 1987) and nonparametric methods of evaluating persistence in real output and aggregate prices, I find consistent discrepancies between the two even when estimated coefficient values vary markedly from one method to another (Table 2).

Persistence in Log Monthly Real Ind. Output (Y) and Log CPI Price Level (P)   *Table 2*

Nonparametric Estimates (at zero frequency)	P_{cm} value					
	linear trend		stochastic trend		Hodrick-Prescott	
	Y	P	Y	P	Y	P
Bartlett	0.3289	5.5329	0.0762	0.1386	0.1857	1.8616
Parzen	0.2812	5.8550	0.0105	0.0740	0.1188	2.0471
Tukey	0.3005	5.0993	0.0207	0.0953	0.1695	2.1782
Parametric Estimates (standard errors in parentheses)	0.5206 (0.117)	1.6636 (0.147)	0.0 (0.0)	0.2449 (0.114)	0.3029 (0.124)	1.4685 (0.161)

Another piece of empirical evidence concerning higher nominal than real persistence in the Romanian transition economy is the equation below, which estimates the impact of contemporaneous and first-lagged changes in log monthly nominal GDP (DLGDP) on the level of log detrended real industrial output (LY). The estimated cumulative effect of monthly GDP is 0.9967 ($t = 2.2992$), suggesting that the bulk of adjustment is effected through nominal means.[29]

$$LY_t = 0.044673 * DLGDP_t + 0.054993 * DLGDP_{t-1} - 0.013116 + 0.840316 * LY_{t-1} + \hat{q} \quad (5)$$

---

[29] The present specification extends the one employed by Ball, Mankiw and Romer (1991). Monthly nominal GDP data for the 1991 – 1995 sample was taken from estimates by Dobrescu (1997). The sample is 1991:01 – 1995:12; Newey-West autocorrelation and heteroscedasticity-consistent standard errors and covariances were also employed; t-statistics are included in parentheses. $R^2_A = 0.685674$, logL = 75.32599, DW = 1.933793, $F = 42.44671$, p(F) < 10⁻⁶. The larger the LGDP coefficients, the more real adjustment will predominate.

(4.122085)   (5.283574)   (-1.552018) (11.75716)

The above evidence, together with the existence of the output-inflation tradeoff, indicates that Romanian monetary policy (and macroeconomic policy more generally) should primarily be oriented towards achieving sustainable stabilization in the medium and long run. Not only is the cost of reducing high inflation mitigated in the presence of the tradeoff, but following an expansionary path results in strong and persistent increases in inflation with practically no real output gains.

II. 2 Credit Channel Transmission and the Central Bank Reaction Function

Identifying the channel(s) of monetary policy transmission represents a key issue in evaluating the effects of monetary instruments. Due to the underdevelopment of financial markets (which are incomplete or sometimes marginally functional compared to fully-fledged market economies) and to the limited effectiveness of certain key policy instruments (open market operations, for

Figure 6

example), monetary policy impulses are primarily transmitted through a bank credit channel, also complemented by an exchange rate channel. The credit channel works through the asymmetric effects generated by a reduction in the supply of bank credit to real-sector firms, the ones most affected being smaller entities with lower immunity and whose capital structures do not allow for

Dynamic Multipliers from VAR(6) on Detrended LY, LCPI, LRMBASE and CB_I_A, 1993:07 1997:07

Response of CB_I_A to One S.D. LRMBASE Innovation

significant collateral. These smaller firms overwhelmingly belong to the private sector, since the size distribution of state-sector firms is skewed towards larger enterprises, while privatization has been relatively slow. Of course, the predominance of the credit channel in Romania's transition does not exclude interest rate channel transmission, but rather relegates it to a peripheral role that is visible from the shallowness and short duration of liquidity effects. This is also a feature of fast-acting Fisher effects due to short outside monetary policy lags (in turn, these are dependent on the chronic undercapitalization of state firms) and to the existence of the output-inflation tradeoff (Figure 6 and Appendix 13).[30]

---
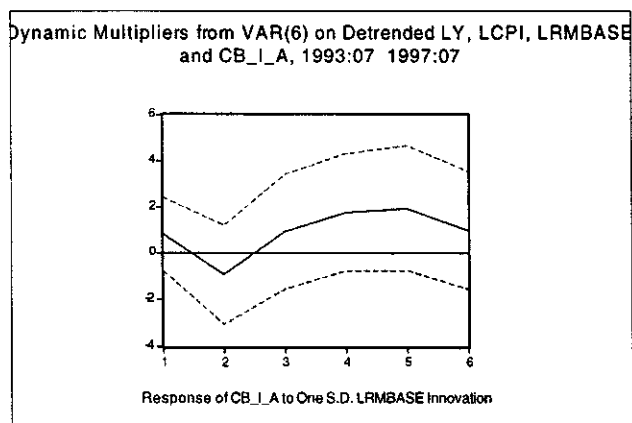
[30]The VAR(6) is specified on log real industrial output (LY), the log CPI price level (LCPI), log real base

22

Credit channel transmission reveals the existence of differential behavior on behalf of state- and private-sector firms, as illustrated in equations (6) and (7), estimated over 1993:01 – 1997:07.

$$LRCP_t = 0.212239*LY_t - 0.005048*COMB\_R\_P_t + 2.179742 + 0.933027*\mathring{a}_{t-1} + \mathring{a}_t \quad \textbf{(6)}$$
$$\quad (1.031447) \quad (-2.002547) \quad\quad (2.797348) \ (26.79783)$$

$R^2_A = 0.949941,$ $DW = 1.939877,$

$LogL = 46.66993,$ $DF = 55,$

$F = 342.5788,$ $p(F) \quad 10^{-7}.$

$$LRCS_t = 0.024259*LY_t + 0.000624*COMB\_R\_P_t - 0.307172 + 1.046429*LRCS_{t-1} \quad \textbf{(7)}$$
$$\quad (0.258931) \quad (1.940220) \quad\quad (-0.853732) \ (23.32687)$$

$R^2_A = 0.941621,$ $DW = 1.664520,$

$LogL = 68.12780,$ $DF = 55,$

$F = 291.3306,$ $p(F) \quad 10^{-7}.$

Here, LRCP and LRCS are log real credit to private and state-sector firms, respectively, LY is log real industrial output, COMB_R_P is the real *ex post* average lending rate of commercial banks to non-bank customers (all real variables are deflated with CPI); equation (6) also contains an AR(1) term. While real credit to both private and state sector firms is positively but ambiguously related to the level of output (with relatively stronger significance for the private sector), suggesting the compensation of cash flow needs *via* official borrowing, interest rate elasticities are very different: if credit to the private sector (*i. e.* small firms) exhibits the expected negative and highly significant correlation, credit to larger, state-sector firms is positively correlated with real interest, supporting the hypothesis of budget constraint laxness due to alternative financing through arrears and requests for fresh bank financing with little consideration for the real cost of credit. Stabilization will therefore differently affect the two categories of firms, with a disproportionate credit contraction towards smaller entities, (Kashyap and Stein, 1994; Woodford, 1996), with adverse selection and crowding out problems becoming evident. The unique (at 5%) cointegrating equation (8) below is informative on the crowding out phenomenon: LRCP and LRCS are as above, TREND is a linear deterministic time trend, and standard errors are included in parentheses.

---

money (LRMBASE) and the nominal average refinancing rate (CB_I_A). It includes an intercept and a linear deterministic trend.

$$LRCS = -0.993199*LRCP + 0.034708*TREND - 3.432549 \qquad (8)$$

$$(0.08618) \qquad (0.00216), \qquad \text{logL} = 165.3650.$$

Commercial bank passivity towards large traditional debtors (arising from the uncertain net worth of firms in an economy afflicted with persistent and widespread financial indiscipline, from the inherently higher immunity of this category of firms, from poor credibility on behalf of decision-makers in enforcing hard budget constraints, and from the unattractiveness of asset seizure as an option in the treatment of client firms) becomes entrenched when financial discipline is a way of life, since both banks and clients expect either substantial debt write-offs or a turnaround in the profitability of clients that will allow banks to receive a steady future income stream compared to the negligible commercial value of property resulting from foreclosures, the latter seen as minimizing the net present value of potential bank losses (Popa, 1996). When the relatively weak capitalization of the banking system is also taken into account, the result is the lack of a normal correlation between the demand for refinancing credit and its attendant average interest rate, another feature of pervasive lax budget constraints. In equation (9) estimated over 1992:02 – 1997:02, *lrfin* is detrended log monthly refinancing credit, while cb_i_a is the percent average refinancing interest rate. The equation contains an AR(1) term, as well as robust standard errors in parentheses. L is the lag operator.

$$(1 - 0.434360*L)*lrfin = -0.215301 + 0.004066*cb\_i\_a + (1 + 0.670225*L)*\hat{q} \qquad (9)$$

$$(0.162395) \qquad (0.065799) \quad (0.000852) \qquad (0.139586),$$

$R^2_A = 0.941196$, DW=1.811623, logL = 55.43302, F=225.0774, p(F)=0.0.

The priority of a credit channel in monetary policy transmission is, of course, not independent of nominal-real tradeoffs or of persistent financial indiscipline. 12-lag Granger causality tests over 1992:01 – 1998:06 indicate that short-term credit to state-sector firms is a significant predictor of the aggregate price level (and vice versa), whereas short-run credit to private firms, although dominant in total short-term credit to nongovernment, fails to perform the same function (Table 3). LCPDET and LCSDET are log detrended nominal credit to private- and state-sector firms, respectively, while LCPI1 is the log detrended CPI price level. These results support the liquidity flow smoothing hypothesis at the representative firm level when budget constraints undergo a relaxation and there is more permissive access to external finance. Easier credit conditions tie in with

the output-inflation tradeoff, and are not to be explained solely on the basis of the dominant state sector share in manufacturing.

Results from Granger Causality Tests   Table 3

Null Hypothesis:	Obs.	F-Statistic	Probability
LCPI1 does not Granger Cause LCPDET	47	1.40635	0.23529
LCPDET does not Granger Cause LCPI1		0.56471	0.84677
LCPI1 does not Granger Cause LCSDET	47	1.91434	0.09005
LCSDET does not Granger Cause LCPI1		2.41215	0.03536

The interaction between credit channel transmission and persistent financial indiscipline reveals yet another asymmetry between private- and state-sector firms, with the latter able to diversify financing away from official borrowing when a credit squeeze takes place. By constructing diversification indices similar to measures proposed by Kashyap, Stein and Wilcox (1993), as ratios between official credit to a sec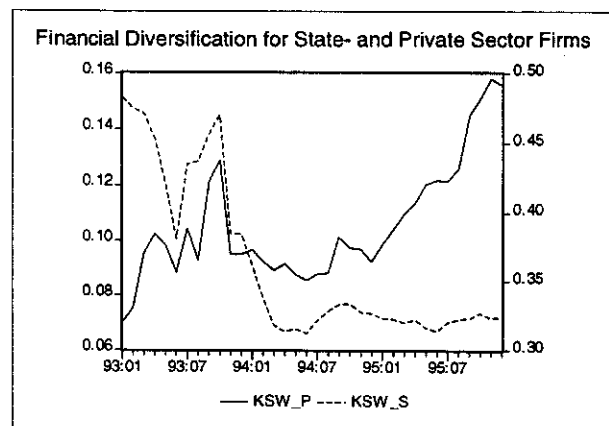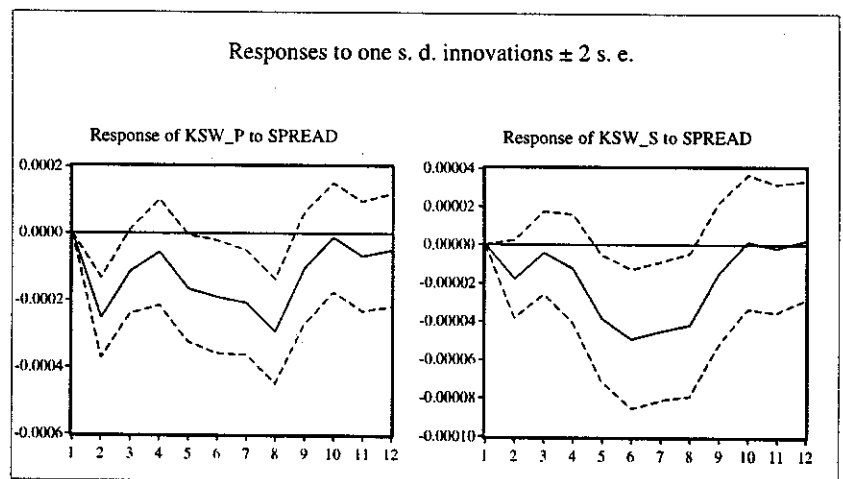tor, on one hand, and the sum of official credit and total arrears, on the other (I denote these indexes as ksw_p for the private sector and ksw_s for the state sector, respectively), it is apparent that larger, majority state-owned firms are better able to resort to defaulting on their debt in order to counteract the effects of a decrease in the supply of credit (Figure 7). Thus, smaller, private firms are

Figure 7

Financial Diversification for State- and Private Sector Firms

— KSW_P ---- KSW_S

Figure 8

Responses to one s. d. innovations ± 2 s. e.

Response of KSW_P to SPREAD   Response of KSW_S to SPREAD

strongly dependent on bank lending and, due to the relatively harder budget constraints they face, bear a disproportionate brunt of arrears proliferation as net creditors.

The above measures of financial diversification are also useful in capturing net worth effects in credit channel transmission. Proxying the variation of quality in firms' liquidity flows by the spread

between average commercial bank deposit and lending rates to nonbank customers (SPREAD), I find that positive shocks to this (associated with a worsening of firms' official liquidity flows – Barran and Kegels, 1996) are associated with a decrease in the supply of bank credit, as measured by the KSW_S and KSW_P indices (Figure 8 illustrates the dynamic multipliers from a VAR(6) on KSW_S, KSW_P and SPREAD over 1992:05 – 1995:12). Both sectors yield similar responses indicative of the pervasiveness of net worth problems, but the intensity of response is, as expected, higher for smaller, private companies, for which the deterioration also appears to be more persistent (Appendix 14). In its turn, financial market segmentation has allowed larger firms to cluster around dominant state-owned banks, thereby amplifying adverse selection effects.

It is interesting to observe that, due to segmentation and also to the better ability of large, state-owned firms to generate arrears at the same time as receiving fresh bank lending (due to their liquidity flow smoothing objective), I find the nominal-real tradeoff interacts with the credit-based transmission of monetary policy. Equation (10) estimated over 1992:12 – 1998:06 indicates that, while higher short-term credit to the private sector is output-enhancing, extending more credit to majority state-owned firms is unambiguously negatively related to the level of real activity (here, LY, LRCP and LRCS are log detrended real industrial output, credit to the private sector and credit to the state sector, respectively, while $\mathring{q}_t$ represents a moving average residual correction and t-statistics are included in parentheses):

$$LY_t = 0.175290*LRCP_t - 0.045713*LRCS_t + 3.639571 + 0.492427*\mathring{q}_{t-1} + \mathring{q} \qquad (10)$$

$\qquad$ (5.302836) $\qquad$ (-2.730412) $\qquad$ (30.60604) $\quad$ (4.091489)

$R^2_A = 0.683256$, $\qquad$ DW = 1.851836,

LogL = 95.52213, $\qquad$ DF = 67

$F = 48.45676$, $\qquad$ $p(F)$ $\quad$ 10 $^{-7}$.

The proliferation of arrears is associated in the longer run with an increased flow of bad bank debt, due to the inelastic credit demand of unrestructured firms and to creditor passivity. The private sector, as it operates under comparatively harder budget constraints and also due to its net creditor position, may encounter problems in its access to financing, as bad debt will increasingly affect it as a result of an increasing stock of receivables in arrears, some of which must inevitably be foregone. Given that bank financing and payments arrears are not perfect substitutes, the evolution of aggregate supply will reflect, among other factors, the credibility of introducing more rigid budget constraints.

An additional important feature of the credit channel coexisting with persistent financial indiscipline is represented by implicit pressures to accommodate arrears growth through official bank finance, after these overstep a certain threshold. The box below presents the results of a probit estimation of the effects of detrended log nominal arrears (ARRS) and the PPI price level (LP) on large upward changes in log credit to nongovernment (REV_NGC, which takes values of 1 for positive changes in log detrended credit to nongovernment larger than one standard deviation away from the mean). An increase in nominal arrears and/or the aggregate price level is significantly associated with a higher probability of upward revisions in nongovernment credit that implicitly validates financial indiscipline and contributes to inflation persistence as well. These results confirm the poor efficiency of arrears financing, due to coordination failures at system level, increased uncertainty and payments system difficulties, as particular expressions of increased transaction costs in the longer run.

PROBIT // Dependent Variable is REV_NGC
Period: 1991:02 1995:05
Convergence obtained after 3 iterations

Variable	Coefficient	Std. error	*t*-statistic	Prob.
ARRS	1.119058	0.609494	1.836045	0.0724
LP	1.875984	1.055936	1.776607	0.0818
C	1.234147	0.260714	4.733712	0.0000

LogL =	-15.29945	
Obs with Dep=1	46	
Obs with Dep=0	6	

Variable	Avg. all obs.	Avg. D=1	Avg. D=0
ARRS	0.007842	0.049252	-0.309637
LP	0.096390	0.116622	-0.058718
C	1.00	1.00	1.00

When the NBR's reaction function is estimated by regressing real average refinancing rate changes on positive and negative deviations from trend in log real output and the log PPI price level (equation (11)), I detect the existence of structural inconsistency, especially for 1992:02 – 1996:03 (extending the sample to 1997:07 yields a clearer stabilization component, including for higher than expected output growth, and correspondingly less emphasis on expansion – Appendix 15). This takes the shape of a stabilization approach (with interest rates increasing significantly when prices rise above

trend) that coexists with an expansionary approach (which sees interest rate decreases as meant to counteract dips below trend in real output). This is valid even for expected contemporary values of aggregate price and output fluctuations. Interestingly, the central bank seems not to react significantly either to lower than expected (or trend) prices, nor to higher than expected real output, both of which appear to be treated as windfalls.

$$(1 - 0.970016*L)*cb\_r\_p = 113.1618*ap1 - 61.54506*as2 - 3.704901 + (1 + 0.461147*L)*\hat{q} \quad \textbf{(11)}$$

$$\quad (31.4401) \qquad\qquad\quad (3.804117) \quad (-2.787383) \quad (-2.602965) \qquad (3.346337),$$

$R^2_A = 0.979085,$ $\qquad$ DW = 1.860560

logL = -148.2756, $\qquad$ DF = 45,

$F = 562.7489,$ $p(F)$ 10^{-5}.

Here, cb_r_p is the change in the *ex post* real average refinancing rate of the NBR (deflated with PPI), $ap1$ represents the variations above trend of the log CPI price level, $as2$ indicates the variations below trend of log real industrial output; all variables were detrended accounting for structural breaks determined *via* Chow tests. The residual is corrected with a MA(1) term, while t-statistics are reported in parentheses.

Conducting a LR test on whether substantially different results are obtained when the regression allows for symmetric variations around trend for both aggregate prices and real output yields a test statistic of $-2(-148.2756 + 147.3339) = 1.8834$, which has an attached p-value for the χ^2_2 distribution of 0.3899. Therefore, the two specifications do not appear to differ significantly, which tends to support the windfall hypothesis. When the lagged availability of information to the monetary authority is taken into account by means of reestimating (11) *via* two-stage least squares with lagged $ap1$ and $as2$ as instruments (effectively using the forecasts of variations around trend from previous period experience instead of realized fluctuations), the signs and magnitudes of coefficients do not change substantially, the only departure being the loss in significance of the expansionary bias (the $as2$ coefficient is now significant only at 12%) (Appendix 16).

The above results point to an essential problem in Romanian monetary policy up to 1996, namely the lack of a clear prioritization of objectives which, when stabilization and expansion biases coexist, leads not only to a dynamic inconsistency problem, but possibly to a static one as well. By attempting to satisfy both objectives at the same time, the NBR was occasionally in a position to compromise on each. Moreover, in the presence of an output-inflation tradeoff which leads to divergent paths for

aggregate prices and real activity, the effect of an expansion bias leads to less austere monetary policy responses than would be required to counteract inflationary expectations or (even more frequently) to stop-and-go approaches to policy implementation, both of which negatively affect the credibility of the monetary authority. Policy effectiveness is thus eroded, while expectations of higher inflation become entrenched. Of course, the past lack of functional independence of the central bank has made an essential contribution to the conflict of operational objectives pursued by the monetary authority.

3. Conclusions and Policy Recommendations

The timing, intensity and skewness of monetary policy effects in the Romanian transition economy are determined by the existence of the output-inflation tradeoff, by persistent financial indiscipline and, last but not least, by the paramount importance of transmission *via* the credit and exchange rate channels. Hence, effects tend to appear faster, are predominantly nominal, and play out sooner than in industrial countries; they are also initially sharper but less persistent for monetary aggregates than for interest rates. More credible instruments or less politically visible ones have up to 1997 tended to exert comparatively stronger real and nominal effects. Financial indiscipline interacts with credit channel transmission due to the imperfect substitutability of arrears and bank credit, one of the consequences being adverse selection, where the burden of a credit squeeze is borne disproportionately by the private sector and smaller firms that are active in competitive industries and are faced with hard budget constraints.

The effect on the banking sector is quite complex: persistent financial indiscipline and inelastic credit demand from poorly efficient but large firms are unambiguously associated with a (present or future) flow of bad debt into the financial sector, especially as structural adjustment gains momentum. However, the idea of commercial bank portfolio clean-up (with slow privatization) is in its turn accompanied, beside moral hazard, by the risks of higher inflationary pressures in the future (due to a stock of public debt that is growing at an unsustainable rate), as well as those of reducing the future level of real activity and distorting resource allocation by a future increase in taxation. Even banks endogenously resorting to wider spreads in order to partially allow recapitalization will raise the cost of borrowing, thereby affecting resource allocation. Therefore, the constraints that operate on the requirements for establishing a performant banking system are closely related to the often-contradictory fiscal and monetary positions of an economy with delayed or staggered transition.

The quality and effectiveness of monetary policy are directly dependent on the quality of systemic transformation in general, with the monetary authority asymmetrically bearing the costs of

postponed, weakly coordinated and poorly credible reform processes. Restrictive monetary policy is necessary but not sufficient for the attainment of sustainable macroeconomic stability; indeed, successive attempts at macrostabilization have all relied on restrictive monetary policy as an imperfect substitute for instituting hard budget constraints by means of substantive fiscal adjustment as well as microeconomic and sectoral reforms. The role of monetary policy as substitute for structural reforms has in all these cases only been successful in the short term, while the inevitable erosion of disinflationary gains has negatively affected the monetary authority's credibility, making each newly initiated stabilization program harder and more costly to achieve. Diminishing returns are so strong that, in the absence of comprehensive structural adjustment, enterprise reform and the substantial limitation of financial indiscipline, the longer-run lack of effectiveness of monetary policy will be invariant to the quality of its design and/or implementation.

Monetary policy is also confronted with the constraints of operating in an informationally noisy environment, as well as those of the central bank's imperfect credibility, which – besides the problem of its imperfect ability at controlling nominal and real variables – raises the issue of signaling. Using monetary policy instruments to clearly announce the authorities' macroeconomic intentions and expectations, given the additional implicit need for shortening agents' learning curves. When both relative price and behavioral changes are high in the short and medium runs, it is important that monetary policy exhibits transparency and consistency within the broader context of the monetary-fiscal mix. The operational predictability of monetary policy (which by no means precludes responding to shocks flexibly) is also necessary from the perspective of endogenous learning (by imitation) at firm level, since it allows for a higher homogeneity of expectations formation conditional on improvements in central bank credibility.

Persistent soft budget constraints, the protracted character of structural transformation, and the weak medium-term sustainability of stabilization improvements all require maintaining a restrictive monetary policy stance in the foreseeable future. Tight monetary policy is even more necessary in the presence of nominal-real tradeoffs. In the latter case, the policy cost-benefit reasoning is between, on one hand, maximizing the likelihood of a virtuous equilibrium (in which real activity increases sustainably on the background of declining inflation) when multiple welfare-rankable equilibria exist, and, on the other hand, the nonlinear real effects of restrictive monetary policy making stabilization more costly as one moves towards lower inflation regimes, together with the potential lack of credibility of overtly tight programs. Since the existence of previous unsuccessful stabilization attempts will be taken into account in forecasts formed even by agents with adaptive expectations, program credibility will be affected regardless of its perceived austerity. Therefore, the only outcome is the time-consistent implementation of a stabilization program where tight monetary policy is supported by the requisite fiscal adjustments, on the background of improvements in

financial discipline and corporate governance. In terms of the general profile of monetary policy, its credible and consistent design covering a longer time span appear as more important than fine-tuning.

The main policy recommendations for Romania thus concern consolidating the *de jure* and *de facto* independence of the NBR and clearly stating its objectives. Substantial progress has been made recently through the adoption of a new Statute of the central bank, which gives the monetary authority both goal and instrument independence, confirms its sole accountability to Parliament and, most importantly, states that price stability is the main objective of monetary policy. Legal improvements have to be strengthened by operational ones as well, especially in what concerns the conduct of monetary policy when fiscal and real distortions persist. Also, since price stability is viewed through the objective of domestic currency stability, its reiteration through concrete decisions adopted by the leadership of the central bank will have beneficial effects.

In order to avoid time inconsistency problems, it is crucial that the central bank defines a coherent longer-term decision-making horizon. This should include multi-annual inflation targets along with a clear hierarchy of final objectives, intermediate targets and attendant policy instruments. In the latter sense, it is important that instruments are employed in a consistent manner, one correlation that stands out being that between the signaling function of monetary policy and the implementation of consistent monetary policy actions in the context of ongoing institution building and the diversification of the range of available monetary policy tools.

Also, because of the limited instruments at its disposal, as well as due to an incomplete and/or incipiently functional institutional framework, monetary policy must be designed in terms of relative optimization, where recourse to the effective implementation of policy rules, for example, can only be partially realized. While in the short run rules may be used to support internal decision-making at the central bank level, in the longer run, after disinflationary gains have been credibly and durably internalized and frequent idiosyncratic shocks arising from delayed transformation are largely past, inflation targeting should represent the choice for Romanian monetary policy, as recently detailed in the country's medium-term economic strategy for the preparation of accession to the European Union. This, of course, will require advance practice in ensuring the consonance between inflation objectives and attendant central bank, independent and market forecasts regarding aggregate prices as foundations of future policy actions, in an attempt to shift to inflation forecast targeting in the future (Svensson, 1996, 1997).

Another recommendation that is intimately connected to the continuation of transformation at microeconomic and sectoral levels concerns reforming the banking sector. Commercial bank privatization, substantial improvements in bank supervision and the enforcement of prudential regulations, tackling the bad debt issue, and the development of alternative, market-based financing

all address the correction of firms' asymmetric access to credit and reducing the banking sector's vulnerability to the immediate and longer-run effects of persistent and generalized financial indiscipline. All the recommendations above notwithstanding, the most important change to be effected is making Romanian monetary policy more proactive within a consistent macroeconomic policy mix, while structural adjustments, privatization and improvements in corporate governance are accelerated effectively.

REFERENCES

Alesina, Alberto, and Allan Drazen, 1991 - "Why Are Stabilizations Delayed?", in: *Monetary and Fiscal Policy, vol 2: Politics*, ed. Torsten Persson and Guido Tabellini, 1994, MIT Press, Cambridge, MA/London, pp. 387-414

Akerlof, George A., and Janet L. Yellen, 1985 – "A Near-Rational Model of the Business Cycle, with Wage and Price Inertia", in: *New Keynesian Economics*, vol I - *Imperfect Competition and Sticky Prices*, ed. N. Gregory Mankiw and David Romer, MIT Press, Cambridge, MA/London, 1991, pp. 43 – 58

Anderson, Ronald W., and Chantal Kegels, 1998 – *Transition Banking*, Clarendon Press, Oxford

Ball, Laurence, N. Gregory Mankiw, and David Romer, 1991 - "The New Keynesian Economics and the Output-Inflation Tradeoff", in: *New Keynesian Economics*, vol. I - *Imperfect Competition and Sticky Prices,* ed. N. Gregory Mankiw and David Romer, MIT Press, Cambridge, MA/London, pp. 147 – 214

Barran, Fernando, and Chantal Kegels, 1996 - "Channels of Monetary Policy in a Transition Country: Hungary", Working Paper no. 9636, Département des sciences économiques, Université Catholique de Louvain, June

Barro, Robert J., 1995 – "Inflation and Economic Growth", Working Paper no. 5326, National Bureau of Economic Research, Inc., Cambridge, MA, October

Begg, David K. H., 1996 - "Monetary Policy in Central and Eastern Europe: Lessons After Half a Decade of Transition", IMF Working Paper WP/96/108, International Monetary Fund, Washington, DC, September

Bernanke, Ben S., and Ilian Mihov, 1995 - "Measuring Monetary Policy", Working Paper no. 5145, National Bureau of Economic Research, Cambridge, MA, June

Blanchard, Olivier, 1997 – *The Economics of Post-Communist Transition*, Clarendon Lecture Series, Clarendon Press, Oxford

Bruno, Michael, and William Easterly, 1995 - "Inflation Crises and Long-Run Growth", Policy Research Working Paper no. 1517, The World Bank, September

Calvo, Guillermo A., and Fabrizio Coricelli, 1996 - "Monetary Policy and Interenterprise Arrears in Post-Communist Economies: Theory and Evidence", in: *Journal of Policy Reform*, vol. 1, issue 1, pp. 3-24

Campbell, John Y., and N. Gregory Mankiw, 1987 – "Are Output Fluctuations Transitory?", in: *Quarterly Journal of Economics*, vol. 18, pp. 373-399

Chari, V. V., Lawrence J. Christiano, and Martin Eichenbaum, 1995 - "Inside Money, Outside Money and Short-Term Interest Rates", Working Paper no. 5269, National Bureau of Economic Research, Cambridge, MA, September

Chari, V. V., Lawrence J. Christiano, and Martin Eichenbaum, 1996 - "Expectation Traps and Discretion", Working Paper no. 5541, National Bureau of Economic Research, Cambridge, MA, April

Clifton, Eric, and Mohsin Khan, 1993 - "Interenterprise Arrears in Transforming Economies: The Case of Romania", *IMF Staff Papers*, vol.40, no.3, September, pp.680-696

Croitoru, Lucian, 1994 - "Politica de stabilizare si impunerea restrictiilor financiare tari intr-o economie in tranzitie", in: *Œconomica* no. 1, pp. 21-51

Daianu, Daniel, 1996 – *Transformarea ca proces real*, IRLI Publishers, Bucharest

Dobrescu, Emilian, 1996 – *Macromodels of the Romanian Transition Economy*, Expert Publishing House, Bucharest

Dobrescu, Emilian, 1997 – "Dihotomia real-nominal in economia romaneasca de tranzitie", in: *Microeconomia Aplicata*, nr. 1, Supplement

Drazen, Allan, 1996 - "The Political Economy of Delayed Reform", in: *Journal of Policy Reform*, vol. 1, issue 1, pp. 25-46

Galí, Jordi, 1992 – "How Well Does the IS-LM Model Fit Postwar U. S. Data?", in: *Quarterly Journal of Economics*, May, pp. 709-738

Greenwald, Bruce, and Stiglitz, Joseph, 1989 - "Toward a Theory of Rigidities (Economic Fluctuations as Coordination Failures)", *Papers and Proceedings of the American Economic Association Annual Meeting, American Economic Review*, vol.79, no.2, May, pp.364-370

Kashyap, Anil K., and Jeremy C. Stein, 1994 - "Monetary Policy and Bank Lending", in: *Monetary Policy*, ed. N. Gregory Mankiw, National Bureau of Economic Research Conference on Research in Business Cycles, The University of Chicago Press, Chicago & London, pp. 195-256

Kashyap, Anil C., Jeremy C. Stein, and David W. Wilcox, 1993 – "Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance", in: *American Economic Review*, vol. 83, no. 1, March, pp. 78-98

King, Robert G., and Charles I. Plosser, 1984 – "Money, Credit and Prices in a Real Business Cycle Model", in: *American Economic Review*, vol. 74, no. 3, June, pp. 363-380

Kornai, János, 1995 – *Highway and Byways: Studies on Reform and Postcommunist Transition*, MIT Press, Cambridge, MA/London

López Murphy, Ricardo, and Federico Sturzenegger, 1996 - "The Feasibility of Low Inflation: Theory with an Application to the Argentine Case", in: *Journal of Policy Reform*, vol. 1, issue 1, pp. 47-74

Lucas, Robert E., Jr., 1972 – "Econometric Testing of the Natural Rate Hypothesis", in: Otto Eckstein (ed.), *The Econometrics of Price Determination Conference*, Board of Governors of the Federal Reserve System, Washington, DC, pp. 50-59

Lucas, Robert E., Jr., 1973 - "Some International Evidence on Output-Inflation Tradeoffs", in: *American Economic Review*, vol. 63, no. 3, June, pp. 326-334

Munteanu, Costea, 1994 – "Reform Policy in Romania during 1990-1993: A Case for Pathological Gradualism", paper presented at the 3rd EACES Conference, Budapest, September

OECD, 1993 - *Romania: An Economic Assessment*, Paris

Perotti, Enrico C., 1995 – "Inertial Credit and Opportunistic Arrears in Transition", working paper, University of Amsterdam (mimeo)

Perotti, Enrico C., 1996 – "The Rational Creation of Financial Arrears: Evidence from a Survey of Bulgarian State Managers", IMF Research Department Seminar paper, University of Amsterdam, July (mimeo)

Petersen, Mitchell A., and Raghuram G. Rajan, 1996 - "Trade Credit: Theories and Evidence", Working Paper no. 5602, National Bureau of Economic Research, Cambridge, MA, June

Pinto, Brian, Marek Belka, and Stefan Krajewski, 1993 – "Transforming State Enterprises in Poland: Evidence on Adjustment by Manufacturing Firms", in: *Brookings Papers on Economic Activity*, no. 1, pp. 213 - 270

Pinto, Brian, and Sweder van Wijnbergen, 1995 – "Ownership and Corporate Control in Poland: Why State Firms Defied the Odds", CEPR Discussion Paper no. 1273, December

Popa, Cristian, 1992 - "Price Liberalization and Inflation in the Transition to a Market Economy: The Romanian Case", paper presented at the 2nd US-Romanian Economic Roundtable, Arlington, VA, April (published in "Transition to a Market Economy in Romania: Empirical Evidence", *IREX Conference Report*, Princeton, NJ)

Popa, Cristian, 1994 - "The Dynamics of Inter-Enterprise Arrears in Romania's Transition: A Microeconomic Approach", paper presented in Prof. János Kornai's workshop on postsocialist transition, Harvard University, November 1994 (published in *Romanian Economic Review*, 1/1997)