Channels of Monetary Policy in a Transition Country: Hungary[♣]

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ABSTRACT

In the last years, Hungary recorded huge current deficits. These results may endanger the capacity of repayment of the outstanding debt and thus its access to international financial markets. We analyze how domestic credit market conditions have affected the current account performance. Implementing Granger-causality tests on time series data over the period 1990-1994, we find that current account performance was negatively affected by credit contraction. Furthermore, using desegregated data on credit, we are able to show that credit to small enterprises is highly significant to explain current account performance as well as the level of unemployment.

RESUME

Au cours des dernières années, la Hongrie a enregistré d'importants déficits courants. Ces mauvaises performances peuvent mettre en danger la capacité de remboursement de la dette extérieure et de là, priver le pays de l'accès aux marchés internationaux des capitaux. Nous analysons comment les conditions du marché domestique du crédit ont influencé les performances en termes de solde courant. Utilisant des test de causalité de Granger sur des séries temporelles couvrant la période 1990-1994, nous trouvons que le compte courant a été négativement influencé par la contraction du crédit. De plus, utilisant des données désagrégées sur le crédit, nous sommes capables de montrer que le crédit aux petites entreprises est très significatif pour expliquer les performances du compte courant ainsi que celle de l'emploi.

Keywords: transition, monetary policy, crowding-out effect, Hungary

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1. INTRODUCTION

A main problem in Eastern European countries is how to conduct monetary policy. In the previous socialist system, money was mostly limited to its accounting function. In the banking system, there was a separation between households and enterprises.[1] The role of monetary policy was restricted to finance production targets. The transition to a market economy restores money in all its functions and is coupled with structural changes such as the creation of a two-tiered banking system. These changes are progressive and create severe disturbances in the transmission mechanism of monetary policy. The structural changes of these economies have generated an unstable relation between money demand and output. For instance, between the end of 1992 and 1994, the velocity of M2 increased from 1.92 to 2.16, in Hungary.[2]

The main objective of this paper is to analyze the channels of monetary policy in Hungary. The implementation of monetary policy in Hungay has been complicated by the increasing public deficit. As the monetary policy attempts to control the domestic credit creation, there is a potential competition between the government and the productive sectors in obtaining external financing. A descriptive analysis of credit aggregates evolution underlines the presence of this crowding-out effect. Using econometric analysis, we show that credit aggregates have been important in explaining the evolution of the real economy in Hungary.

Currently, macroeconomists accept that monetary policy actions affect economic activity, at least in the short run. Nevertheless, there is far less agreement about exactly how monetary policy exerts its influence. Two different, though not incompatible, channels are usually considered. First, the "interest rate channel". According to this view, a tightening of monetary policy leads to an increase in the overall level of interest rates which in turn affects investment and output. Second, the so called "credit channel". Two different components are present in the credit channel. On the one hand, there is a "lending channel" according to which monetary policy actions influence economic activity by affecting the flow of credit. Monetary policy actions may therefore affect those borrower's that are bank dependent. On the other hand, monetary policy may influence borrower's balance sheet. This is the "balance sheet channel" of the monetary transmission mechanism. It is based on the idea that credit market frictions may drive a wedge between the cost of internal finance and external funds. This wedge is inversely related to the borrower's net worth. Thus, the balance sheet channel stresses the importance of monetary policy with respect to the borrower's balance sheet and its effects on the relative structure of interest rates. The "credit channel" does not constitute an alternative to the monetary transmission mechanism but amplifies interest rate effects by changes in the external finance premium.

Establishing the quantitative significance of these components of the monetary transmission mechanism is not an easy task. Furthermore, their relative importance may have changed at different points in time, according to economic and institutional conditions.[3] Using US data, Friedman (1983, 1988) and Bernanke (1986), show that credit aggregates perform

[1] Typically, there were two kinds of banks, one which financed enterprises and the other which collected households savings, without direct contact between them.

[2] See: NBH (1995).

[3] Most of today's discussion about monetary policy in capitalist economies is about how changes in financial institutions and regulations have affected the different components of the monetary transmission mechanism.

better than monetary aggregates on predicting aggregate activity.[4] They have interpreted these findings as evidence for a bank credit channel. Subsequent research, however, has shown that credit (driven by credit demand) behaves countercyclically and testing the existence of a lending channel based on the predictive power of credit aggregates is not a correct strategy in "normal" periods. Moreover, Bernanke and Blinder (1992) find that two quarters after a monetary contraction, loans remain almost constant.[5] The ability of banks to maintain the level of loans after a monetary contraction leads Romer and Romer (1990,1993), to claim that monetary tightening has a large impact on bank's ability to lend only when open market operations are supplemented by actions aimed directly at restricting lending. These results have led empirical research to focus on the "balance sheet" explanation. For instance, Friedman and Kuttner (1992) and Kashyap et al. (1993) using the spread between commercial papers rate and bank loans rate, and the bank lending-commercial paper issuance ratio, as proxies for the stance of credit markets, find that both measures have a predictive power on real activity. This result comes from the "balance sheet channel" since the external finance premia are negatively related to the borrower's financial position. Moreover, Kashyap et al. (1994) show that financial factors beyond those captured by interest rates play an important role in shaping the effects of monetary policy on inventory behavior, by using data on publicly traded companies that do and do not have bonds rating.

While testing the existence and importance of a lending channel by analyzing the predictive power of credit aggregates may seem incorrect for developed and stable countries like US and Western European countries, it is still a valid approach when analyzing periods of financial disrupt or transition process in East European countries. For instance, Bernanke and Gertler (1995) argue that this procedure may be relevant in very special cases, such as the Great Depression, but it is not relevant under "normal" conditions. Analyzing the Great Depression, Bernanke (1983) argues that monetary factors are "quantitatively insufficient" to explain the length and intensity of the depression. He states that along with the effects through the money supply, the financial crisis of 1930-33 influenced the economy by reducing the quality of credit intermediation. The relevance of this channel in transition economies should be more clear once one realizes that first, the limited development of financial markets allows monetary authorities to affect banks' loans through open market operations or other monetary instruments, e.g. Repo, swaps. Second, no perfect substitutes to banks' loans exist for most enterprises. Finally, due to the previous reasons the share of output, employment, and investment accounted for by bank dependent borrowers is higher than in financial developed countries.

The role of the banking credit during transition has been extensively debated in the literature. Hardy and Lahiri (1992) showed how in an overlapping-generations model with long-term investments, the sudden withdrawal of subsidies and liberalization of prices lead to a brief

[4] King (1986) finds that when narrow bank credit aggregates are used, demand deposits have greater predictive content for aggregate economic activity than credit aggregates. For a discussion of these results see also Bernanke (1986). For a further discussion on the credit channel see Romer and Romer (1990, 1993) and Bernanke and Blinder (1992).

[5] Many arguments can be advanced to explain this result. For instance, most bank loans to business in the US are made under loan commitment agreements. Thus, monetary authorities should expect that a tightened monetary policy will decrease the amount of loans not under commitment, while loans under commitment should change only as a consequence of changes in firm's loans demand. Firm's attempt to finance increasing inventories early at the cycle will lead to an increase in outstanding loans. Given that loan commitments are basically extended to large firms, the main part of monetary policy will be supported by small firms. Furthermore, monetary contractions induce a shift in all lending away from small to large enterprises. See Morgan (1992), Nakamura and Lang (1992) and Gertler and Gilchrist (1993).

consumption surge, banks runs and the premature liquidation of investment. However, such an outcome was generally not observable. This might be partly due to the fact that the state has given its explicit or implicit guarantee to the state-owned banks. In addition, the increase in uncertainty has led the households to accumulate precautionary savings, at least during the first years of transition. Calvo and Kumar (1994) tried to rationalize the fall in output that occurred in conjunction with price liberalization, by presenting a model in which enterprises are heavily dependent on bank credit for their day-to-day operations leading to an output very sensitive to changes in the stock of real money. Regarding the public sector, Bofinger (1992), Kornai (1993) and Perotti (1994) underlined that even tight monetary policies may be ineffective in limiting the access of state-owned enterprises to liquidity as deficient capital markets allow for the expansion of monetary substitutes in the form of trade and tax arrears and for the spread of loose financial discipline.

The empirical analysis of the effects of credit on the real economy in the Eastern European countries is still in its infancy. This literature mainly focuses on the debate whether monetary policy in these countries has been too tight and thereby has exacerbated output falls. Borensztein et al. (1993) estimated a simple supply-demand model of industrial output determination for Romania and Czechoslovakia. They incorporated a shock on real bank credit to enterprises to allow for possible liquidity constraints faced by firms over the period. They found that for the two countries, credit variables were not statistically significant. Berg and Sachs (1992) observed that the credit crunch hypothesis is generally inconsistent with the concurrent rise in exports which was recorded in Poland in 1990. However, Calvo and Coricelli (1993) have underlined the role of credit in the output collapse in Eastern European countries. In their analysis, they run cross-section regressions involving 85 branches of industry in Poland. They found that the decline in output has reflected credit contraction. Rosati (1994) objected that the available data does not allow to conjuncture that the fall of credit was a cause of output contraction or rather that it was a result of financial restructuring in enterprises in favor of other less expensive sources of funds such as inter-enterprise credits.

Our empirical analysis are based on the use of time series data and the implementation of Granger-Causality tests. These econometric procedures allow us to study the dynamics of the effects of monetary policy during transition. In line with the results of Calvo and Coricelli (1993), Hungarian data supports the assumption that credit plays an important role when explaining economic performance. Thus, our conclusions can be interpreted as indices in favor of the lending channel of monetary transmission and of the presence of a crowding out effect in Hungary during the period 1990-1994. However, the evolution of financial markets or financial relationships may lead to a deterioration of the capacity of this channel to be a good indicator of the stance of monetary policy and to be informative about real activity.

The paper is organized as follows: in section 2 a brief summary of the macroeconomic context is presented. Section 3 deals with data and methodology. Results are presented in section 4. Section 5 concludes.

2. Monetary policy and economic performance

In Hungary, like in other Eastern European countries, four striking economic developments were coupled with the transition to market-based system.[8] First, the reforms required by the transition delivered a negative shock to the economy causing a huge decrease in output as illustrated by Table 1. At the same time, a private sector emerged, especially in the service sectors which were quasi nonexistent under the previous regime. However, this emergence did not completely balance the contraction of the industrial sector where the state-owned enterprises were concentrated. Therefore, the decline in economic activity and the transformation of the productive structures caused a sharp increase in recorded unemployment which reached more than 12% of the active population at the end of 1992, in a country where unemployment was virtually unknown before the start of the reforms.

Table 1: Main macroeconomic indicators

	Rate of growth of real GDP	Unemployment Rate in %	Inflation* (CPI)	State deficit in % of GDP	Current account (in US$ mil.)
1988	- 0.1	0.0	15.5	-1.4	- 807
1989	0.7	0.3	17.0	-1.4	-1437
1990	- 3.5	2.5	28.9	0.5	127
1991	-11.9	8.0	35.0	-2.2	267
1992	- 3.0	12.3	23.0	-5.6	324
1993	- 0.8	12.1	22.5	-6.4	-3455
1994	2.0	10.4	18.8	-8.2	-3911

*: annual average
Source: NBH, 1995.

Second, the liberalization of prices led to a strong acceleration of inflation at the end of 1990 and during the first semester of 1991 even though the price jump was smaller than in other Eastern European countries such as Poland or the Czech Republic. Inflation, on a yearly basis, reached its peak in 1991 as illustrated by Table 1. Since 1992, the rate of price increases has clearly slowed down but nevertheless, inflation remains at a relatively high level.

Third, the current account has recorded a sharp deterioration since the end of 1992. The main cause of this deterioration was the drop in exports, causing a huge trade deficit. The current account imbalance was partly financed by foreign direct investment and partly by the increase in foreign indebtedness of the country.

Fourth, the transition process has also been associated with an increasing disequilibrium in public finances. The economic recession and the structural changes have caused a decline in the state revenues while the increase in unemployment and other social benefits, led to a continued growth in public expenditures. Moreover, in recent years, and especially in 1994, the state has again increased direct subsidies far from the original targets in order to sustain economic activity.

The increasing public deficit is particularly important for the credit distribution in the economy. Indeed, since 1990, domestic credits to public entities, local and national government, has increased rapidly. In contrast, domestic credit to enterprises has not kept pace and actually

[8] See Calvo and Kumar (1994).

fell even in nominal terms in 1992 and 1993[9]. As a consequence of this evolution, the share of the state in domestic credit has increased and represents since 1992, more than half of credit granted. This public credit expansion might be explained by various factors both on the demand and supply side. High real interest rates and the recession could have restrained the demand for credit by the private sector. However, between 1990 and 1994, the corporate sector has sharply increased its foreign borrowing. The gross debt of this sector has increased from US$ 1230 million (HUF 77.7 billion) in 1990 to US$ 3693 million (HUF 386.8 billion) at the end of 1994[10]. At the same time, the public sector, confronted with an increasing deficit and less monetary financing possibilities, had to fall back on national savings. On the supply-side, banks could have been willing to improve the quality of their assets by reducing their riskier activities, i.e. the lending to the business sector. This willingness could have been reinforced by two new laws enacted at the beginning of 1992, which tightened strongly the financial regulation. The new banking law imposed to banks the same provisions as those applied in OECD countries and the new bankruptcy law altered radically the previous regime by forcing the debtor himself to declare bankruptcy even in the absence of strong pressure from creditors[11]. The same reasons might explain the dramatic increase in the interest spread, defined as the difference between the interest rate paid on loans and the interest rate received for deposit, recorded during 1992 and the high level maintained in the following years.[12]

Thus, the transition process in Hungary has been coupled with the development of macroeconomic imbalances and with deep modifications in the credit allocation. The analysis of the potential link between these elements is important for economic policy, and especially, for monetary policy. During the period, monetary authorities announced as their ultimate objectives, the maintenance of the solvency of the country through the control of the current account balance, and the control of the inflation. The weight given to these two objectives changed over time. The equilibrium of the current account was designed as the first priority of the monetary policy in 1990, 1991, while the reduction of the extremely high current account deficit to an extent that would stop the further growth of external debt was the main objective in 1994. The control of the inflation had the priority in 1992 and 1993.

[9] Moreover, as a consequence of the new Bankruptcy law of 1992, this drop was accompanied by a drastic reduction of interenterprise credits. This source of finance, mostly used by large enterprises, had grown from almost negligible values up to HUF 240 billion or 13% of domestic credit, at the beginning of 1992.

[10] Furthermore, from being net creditor, US$ 1312 million (HUF 82.9 billion) at the end of 1990, the corporate sector became a net debtor with a net debt amounting to US$ 2362 million (HUF 247.4 billion) at the end of 1994. See NBH (1995).

[11] This mandatory self-declared bankruptcy provision was removed in July 1993.

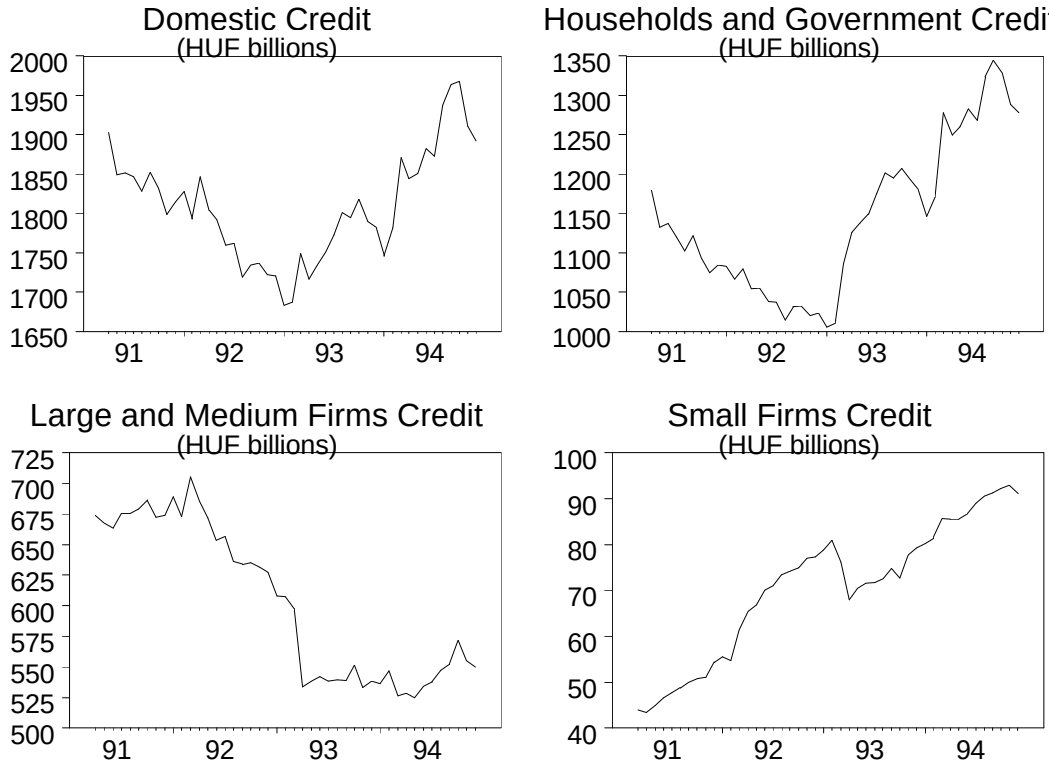
[12] In a less than perfectly competitive banking system, banks build up provisions by increasing their mark-up.

Table 2: Evolution of the gross debt of general government at the end of the year, HUF billion

	1990	1991	1992	1993	1994
Loans from the NBH	776.4	837.2	815.6	779.8	741.2
Government bonds financing the deficit	13.0	26.3	149.5	319.4	465.2
Treasury bills	10.2	60.0	157.2	220.6	314.3
Budgetary debt financing the deficit	799.6	923.5	1122.3	1319.8	1520.7
Other government bonds	28.1	30.0	159.8	442.7	552.9
Debts of the Social Security Funds, the extrabudgetary funds and local governments	27.6	28.6	26.3	45.1	70.9
Domestic state debt of general government	855.3	982.1	1308.4	1807.6	2144.5
- in % of GDP	40.9	39.7	45.3	51.1	49.8

Source: NBH, 1994 and 1995.

The financing of the public deficit is an important factor influencing the implementation of the monetary policy. In order to disrupt the previous practice of monetary financing of the government deficit, the Act LX of December 1991 provided a limit to the financing of the budget by the NBH in percentage of annual budgetary income: 5% in 1993, 4% in 1994 and only 3% as soon as 1995. The implication of these changes in the government deficit financing are illustrated by Table 2. It clearly shows the increasing share of government securities issues (lines 2 and 3) in the financing of gross public debt. Government securities increased from 2.9% of the budgetary debt financing the deficit in 1990 to 51.3% in 1994. However, in 1993, the act was amended by the budgetary law to increase the 1994 limit from 4% to more than 6% of the revenue of the central budget. In addition, until the ceiling on the growth of the government loan stock is reached, the central bank is obliged to underwrite government papers to be issued for the central budget. In 1993, almost all of the government deficit was financed through seigniorage: the consolidated government deficit amounted to more than 7% of GDP and seigniorage appropriated to the government came to 6.3% of GDP as underlined by Hochreiter et al. (1995). Furthermore, in 1994, the total lending (direct lending plus securities holding) to government by the central bank amounted to HUF 1118.7 billion or 52.2% of domestic state debt of general government. Therefore, the government continues to force a central bank assistance when the market conditions become difficult creating perturbation in the conduct of the monetary policy and putting the burden of a restrictive monetary policy on commercial banks and thus on the private sector.



The previous figure illustrates the evolution of domestic credit and its components, deflated by the producer price index. As we can see, the overall tightness of monetary policy is reflected in the fact that domestic credit has contracted in real terms during 1991-1992. When we analyze the evolution of the different components, it appears that the credit contraction mainly hit the medium and large firms. Small enterprise credits grew substantially from very low levels initially. In 1993 and 1994, domestic credit recorded a strong growth. However, it was essentially due to the increase in credit to households and government, credit to medium and large enterprises increasing only slightly. The public deficit financing seems to have created a crowding-out effect of the productive sector.

The previous descriptive analysis tends to show that the development of macroeconomic inbalances in Hungary is not independent from the amount and distribution of credit. The objective of the next section is to test whether this relation is statistically significant. More precisely, we test whether the credit market conditions have an informative content for the evolution of economic activity.

3. Data and methodology

To empirically evaluate the role of monetary authorities' intermediate objectives (money or credit or interest rates), we focus not just on whether this intermediate targets help to explain the evolution of the final objectives of monetary policy but on whether they are able to explain fluctuations that are not already predicted by the final objectives themselves or other relevant

variables available.[13] As long as an information content exists, monetary authorities can exploit it.

The tests are based on autoregressive equations of the following form:

$$\Delta y_t = \alpha + \sum_{i=1}^{i=q_1} \beta_i \Delta y_{t-i} + \sum_{i=1}^{i=q_2} \gamma_i \Delta x_{t-i} + \lambda \; u_{t-1} + \omega_t \qquad (1)$$

where $\Delta y_t = y_t - y_{t-1}$, $\Delta x_t = x_t - x_{t-1}$, and α, β_i, γ_i and λ are parameters to be estimated. u_{t-1} is the error correction term, defined as $u_{t-1} = y_{t-1} - \delta x_{t-1}$. In the absence of cointegration, this term disappears from the equation.

We can rewrite equation (1) as

$$\Delta y_t = \alpha + \sum_{i=1}^{i=q_1} \beta_i \Delta y_{t-i} + \gamma(1) \Delta x_{t-1} + \sum_{i=1}^{i=q_{2-1}} \gamma_j^* \Delta^2 x_{t-i} + \lambda \; u_{t-1} + \omega_t \qquad (2)$$

with $\gamma(1) = \sum_{i=1}^{i=q_2} \gamma_i$, and $\gamma_i^* = -\sum_{j=i+1}^{i=q_2} \gamma_j$

This form allows us to test the significance of the sum of the estimated coefficients of the financial variables through the *t*-statistic on $\gamma(1)$. In the absence of cointegration, financial variables are defined as neutral if this sum is not statistically different from zero.

The data used in the empirical analysis are monthly and non-seasonally adjusted. They cover the period December 1990 to December 1994.[14] A detailed description of data can be found in the appendix. The test statistics presented in Table 4 to 10, are the p-values corresponding to F-statistics for the null hypothesis that all the coefficients associated with the lags of the financial variable, *x*, and λ, are zero. The optimal lags of dependent and explanatory variables have been chosen using the Schwartz Bayesian information criteria, with a maximum of 6 lags.[15] Seasonal dummies were included.

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[13] This is a traditional approach on evaluating the role of monetary authorities' intermediate objectives , e.g., Sims (1972), Friedman (1988), Stock and Watson (1989) and Friedman and Kuttner (1992).

[14] We have performed Dickey-Fuller and Phillips-Perron tests on the variables. Testing the properties of the data generation process of each series, we have not consider the hypothesis where the null is a segment trend stationary variable. One main argument is, again, the reduced size of our sample and the difficulty of distinguishing difference stationary series and trend segmented series, even in larger samples. Over the sample period, all variables except for unemployment, are best represented by I(1) process. Thus, to achieve stationarity these variables have been differenced once. Unemployment has been differenced twice. This atypical characteristic of the series is due to the structural break occuring during the studied period. Results are presented in Appendix 2. See Stock and Watson (1989), for a discussion of the effects of using different techniques to detrend series that possibly contain unit roots in Granger-causality tests.

[15] Because of the size of the sample and to avoid a low estimation precision we have restricted ourselves to 6 lags.

Note that results are conditional to the information set considered. This limitation may be more important than in a structural model where estimations are driving by a theoretical model. Because of data availability and the limit of our sample size, the information set has been limited to only two variables. Thus our results should be interpreted not as the existence of a causal relationship but as the existence of an informational content of the explanatory variable on the dependent one.

4. Results

To assess the importance of the different components of the monetary transmission mechanisms, we have started by analyzing the current account. The sharp deterioration of the current account since the end of 1992, is mainly due to a rapid decrease in exports causing a huge trade deficit as illustrated by Table 3. This drop in the exports is not due to a proportional deterioration in the terms of trade. The terms of trade indicators were indeed approximately stable in 1992 and improved in 1993 and 1994[16]. The deterioration of external trade performances is therefore more due to a volume effect. Hungarian enterprises have faced difficulties in maintaining or increasing the level of their sales on external markets. In 1993 and 1994, in comparison with Poland, the Czech and the Slovak Republics, Hungary lost market shares in Western Europe.[17]

Table 3: Balance of payments of Hungary in convertible currencies (in US$ millions)

	1990	1991	1992	1993	1994
Exports	6346	9258	10028	8094	7613
Imports	5998	9069	10076	11340	11248
Trade balance	348	189	-48	-3247	-3635
Current account	127	267	324	-3455	-3911

Source: NBH, 1995.

From a monetary policy point of view the question is: did the domestic credit conditions play a role in these bad external performances? In order to assess the role of credit, we have tested whether credit Granger caused current account. First, we measured credit as total domestic credit (DC), which aggregates credit to government, state and private enterprises and households. Second, we considered narrower measures of credit. On one hand, we split domestic credit into credit to the government and households and credit to the business sector: the total credit to enterprises (CET). On the other hand, in order to specify more accurately the role of credit, we split CET into credit to enterprises (CLE) including both private and state-owned enterprises, and credit to small enterprises (CSE) which are private. The current lack of data makes a precise distinction between credits to state-owned enterprises and credits to private enterprises, impossible. The selected data is taken both in nominal and in real terms. Because the important divergences observed in the evolution of the consumer price index and the producer price index, we have calculated real data by using both indexes.

Finally, we considered the importance of the "interest rate" and the "balance sheet" channels by introducing the lending rate to the business sector and the spread between the interest

[16] However, this observation has to be qualified by the potential effect of the modification of the structure of the exports on the terms of trade index.
[17] See OECD (1995).

rate on loans and the one on deposits to the business sector, respectively. These two variables have been used in nominal and in real terms. To obtain the real interest rates, the nominal interest rates have been deflated using a moving average of the consumer price index over twelve months.

Before estimating the Granger-causality tests, we have checked for the existence of a cointegration relationship. As we have not found any cointegration among variables, we have estimated equation (2) without the error-correction term.

The results of the regression of the current account on alternative credit aggregates, on interest rates and on spreads, are presented in Table 4. During the period, the increase in the domestic credit has not had a significant impact on the current account performances. A more detailed analysis shows us that the two components of domestic credit have opposite effects. On the one hand, the increase in credit to government and households worsens the current account. This might be due to either a demand side effect or by a crowding-out effect. On the other hand, an increase in credit to enterprises, both in nominal and real terms, improves the results of current account. Therefore, the increase in the share of government and households credit at the expense of credit to enterprises and the reduction of real credit are two of the factors causing the sharp deterioration of the current account performance.

The relation between interest rate, in nominal, and the current account is significative. However, the sign of this relation is not significantly different of zero. This means that there is no long run effect of this variable on the current account. Therefore, interest rate is neutral.

Finally, if the "balance sheet" channel's assumption that the spread is representative of the market conditions, is correct, thus the hardening of credit conditions corresponding to an increase in the spread, leads to a deterioration of the current account. This effect reinforces the results of credit aggregates. We have found that the spread is significant in explaining the current account. However, it has no long term effect on the current account.

Table 4: Dependent variable: current account, optimal lag: 1[18]

Explanatory variables	Optimal lag	P-value of F	Sign of $\gamma(1)$	P-value
Nominal variables				
Domestic Credit	4	0.02	-	0.42
Non-Enterprises Credit	4	0.00	-	0.04
Credit Enterprises: Total	4	0.00	+	0.06
Credit Large Enterprises	4	0.01	+	0.08
Credit Small Enterprises	2	0.04	+	0.01
Real variables				
- *deflated by CPI*				
Domestic Credit	n.s.	n.s.	n.s.	n.s.
Non-Enterprises Credit	4	0.00	-	0.04
Credit Enterprises: Total	4	0.01	+	0.12
Credit Large Enterprises	4	0.02	+	0.15
Credit Small Enterprises	4	0.01	+	0.24
- *deflated by PPI*				
Domestic Credit	n.s.	n.s.	n.s.	n.s.
Non-Enterprises Credit	4	0.01	-	0.20
Credit Enterprises: Total	4	0.00	+	0.05
Credit Large Enterprises	4	0.00	+	0.05
Credit Small Enterprises	4	0.02	+	0.20
Lending Rate	6	0.00	+	0.11
Spread	6	0.01	-	0.19
Real Lending Rate	n.s.	n.s.	n.s.	n.s.
Real Spread	6	0.01	-	0.18

We have further disaggregated the current account into imports and exports. The results are given in Table 5 and 6. While, there is generally a significant effect of credit to enterprises aggregates on imports, the sum of the coefficients is not significantly different of 0, which means that credit variability is neutral.

[18] Results are generally not modified when optimal lags are chosen simultaneously for the dependent and explanatory variables (see Appendix 3). The only exception concerns the Granger causality tests between explanatory variables and unemployment. One of the reasons of this modification could be the presence of a structural break in unemployment data corresponding to the tightening of eligibility criteria at the beginning of 1993.

Table 5 : Dependent variable: Imports broadly defined, optimal lags: 5

Explanatory variables	Optimal lag	P-value of F	Sign of $\gamma(1)$	P-value
Nominal variables				
Domestic Credit	1	0.99	+	0.99
Non-Enterprises Credit	1	0.64	+	0.63
Credit Enterprises: Total	3	0.01	+	0.85
Credit Large Enterprises	3	0.01	+	0.71
Credit Small Enterprises	3	0.05	-	0.85
Real variables				
- *deflated by CPI*				
Domestic Credit	1	0.30	-	0.30
Non-Enterprises Credit	1	0.90	-	0.90
Credit Enterprises: Total	3	0.03	-	0.78
Credit Large Enterprises	3	0.03	-	0.90
Credit Small Enterprises	3	0.07	-	0.65
- *deflated by PPI*				
Domestic Credit	n.s.	n.s.	n.s.	n.s.
Non-Enterprises Credit	1	0.56	+	0.55
Credit Enterprises: Total	3	0.06	-	0.88
Credit Large Enterprises	3	0.06	-	0.99
Credit Small Enterprises	3	0.06	-	0.81
Lending Rate	1	0.77	-	0.77
Spread	2	0.06	+	0.04
Real Lending Rate	4	0.03	-	0.10
Real Spread	2	0.09	+	0.07

These results on the current account are confirmed when examining exports. Table 6 shows that credit to non-enterprises, in nominal and real terms, is generally significant and negative. An increase in the credit to non-enterprises leads to a deterioration of exports, supporting the crowding-out explanation. Furthermore, credit to enterprises is significant and positive. One of the logical links between credit and exports might be the following: a decrease in credit leads to a decrease in output by strengthening firms' budgetary constraint. Under the assumption of a constant "exports/total output" ratio, this will lead to a decrease in exports. If we allow this ratio to change, for instance, if a decrease in credit goes together with a reallocation of production from domestic to external markets, the effect previously described would be mitigated. In order to have a more precise description of the relationship between credit to enterprises and the current account, a set of data on enterprises split according to the main market they serve (domestic or foreign markets) and according to the type of ownership, private or public, would be needed. This kind of information is currently not largely published. However, a study by Ivan Major (1995) on the balance sheet and on fiscal declaration of Hungarian enterprises between 1988 and 1993 indicates that private enterprises with foreign participation had, during the whole period, the highest exports/turnover ratio, followed by state-owned enterprises which had a ratio higher than domestic private enterprises. Yet, the external performances of domestic private enterprises improved and the gap to state-owned enterprises had constantly declined. Moreover, if private firms are more efficient than state-owned enterprises, then even if the latters have a higher export/output ratio, a credit reallocation from private firms to state-owned ones may decrease total export. It is thus useful to consider the relation between credit to enterprises and industrial production, taken as an indicator of the general level of economic activity.

Table 6: Dependent variable: Exports broadly defined, optimal lags: 2

Explanatory variables	Optimal lag	P-value of F	Sign of $\gamma(1)$	P-value
Nominal variables				
Domestic Credit	1	0.31	-	0.31
Non-Enterprises Credit	1	0.04	-	0.03
Credit Enterprises: Total	1	0.02	+	0.02
Credit Large Enterprises	1	0.03	+	0.03
Credit Small Enterprises	1	0.03	+	0.03
Real variables				
- deflated by CPI				
Domestic Credit	1	0.28	-	0.27
Non-Enterprises Credit	1	0.02	-	0.02
Credit Enterprises: Total	1	0.10	+	0.10
Credit Large Enterprises	1	0.14	+	0.13
Credit Small Enterprises	1	0.05	+	0.05
- deflated by PPI				
Domestic Credit	1	0.47	+	0.47
Non-Enterprises Credit	1	0.28	-	0.28
Credit Enterprises: Total	1	0.01	+	0.00
Credit Large Enterprises	1	0.01	+	0.01
Credit Small Enterprises	1	0.01	+	0.01
Lending Rate	4	0.00	+	0.01
Spread	3	0.00	-	0.62
Real Lending Rate	1	0.44	+	0.44
Real Spread	3	0.00	-	0.51

Granger causality tests have not shown any significant relation between any of the financial variables and industrial production. One possible explanation relies on the fact that large enterprises have heavily called on foreign credit and inter-enterprise credit which are not taken into account in our credit measures. Unfortunately, these data are not available. Furthermore, the current statistical coverage of the industrial production is not yet able to accurately measure the evolution of industrial output in Hungary, like in other Eastern European countries. Real activity is likely underestimated by this statistic which covers mainly the production of large enterprises and has great difficulties in incorporating the newly-emerging dynamic private sector.[19] In addition, a decrease in credit might also be coupled with a reallocation of output at the expense of the service sector. This can explain that exports of goods and services decrease while industrial production does not change. A better indicator of the general level of activity would be the GDP, but unfortunately, it is only available on a yearly basis. [20] In order to capture the effect of financial variables on the general level of activity, we have turned to the level of unemployment. We do not consider unemployment as a proxy of industrial production but as another measure of economic activity which should be relevant to policy makers.[21]

[19] See, for example, Berg (1993).

[20] Using the industrial production index to obtain monthly estimations of GDP is not a solution in the context of a country in transition as structural changes modify the relative weight of industry and services in the GDP.

[21] The divergences between the two indicators is partly due to the evolution of labor productivity. Following decline in 1990-1991, productivity in the Hungarian industrial sector recorded a modest growth in 1992 and improved rapidly since 1993, with an annual increase of 15 percent.

As illustrated by Table 7, there is generally no significant relation between credit to enterprises and the level of unemployment, except when credit is deflated by the PPI. Nevertheless, when we decompose credit according to the size of enterprises, we find that credit to small enterprises has a significant negative effect on the unemployment level. A decrease in bank financing to the small enterprises leads to a destruction of jobs and thus to a growth in unemployment. This result is reinforced by the negative relation between the real spread and unemployment. The lack of relation between credit to large enterprises and unemployment might be due to the restructuring process started since the beginning of the transition. The increasing share of credit to small enterprises in the total credit to enterprises, during the period, reduced the effect of this restructuring process.[22]

Credit to government and households has a positive effect on unemployment, i.e. an increase in this kind of credit increases the unemployment level. One of possible explanation of this effect might be the crowding out effect of government financing, which particularly hits enterprises which depend on the domestic banking system.

Table 7: Dependent variable: unemployment, optimal lags: 5

Explanatory variables	Optimal lag	P-value of F	Sign of $\gamma(1)$	P-value
Nominal variables				
Domestic Credit	2	0.03	+	0.01
Non-Enterprises Credit	1	0.02	+	0.01
Credit Enterprises: Total	1	0.23	-	0.22
Credit Large Enterprises	1	0.42	-	0.42
Credit Small Enterprises	1	0.00	-	0.00
Real variables				
- deflated by CPI				
Domestic Credit	1	0.25	+	0.25
Non-Enterprises Credit	1	0.03	+	0.03
Credit Enterprises: Total	1	0.17	-	0.17
Credit Large Enterprises	1	0.29	-	0.29
Credit Small Enterprises	1	0.00	-	0.00
- deflated by PPI				
Domestic Credit	2	0.06	+	0.08
Non-Enterprises Credit	2	0.05	+	0.01
Credit Enterprises: Total	1	0.06	-	0.06
Credit Large Enterprises	1	0.13	-	0.12
Credit Small Enterprises	1	0.00	-	0.00
Lending Rate	1	0.79	-	0.79
Spread	1	0.05	-	0.04
Real Lending Rate	1	0.71	-	0.71
Real Spread	2	0.04	-	0.01

Despite the lack of detailed data, the causality tests have undoubtedly showed the importance of the credit to enterprises when explaining the external performance of Hungary, even if it is not necessary the only explanatory variable. This observation is particularly interesting in a context where the huge budget deficit constrains monetary authorities to maintain their restrictive policy by imposing the burden to the enterprises sector. Moreover, the results

[22] Lending to small enterprises has also been promoted by two public interventions: the creation of the fund for the guarantee of loans to small and medium enterprises and the preferential interest rate E loans designed to help the start of small enterprises.

have underlined the importance of credits to small enterprises for the evolution of current account as well as for the decrease in the level of unemployment. These small enterprises are particularly dependent on domestic bank financing as they are unable to directly borrow neither from the domestic markets nor from foreign ones. During the period covered, commercial banks have been progressively less reluctant to finance these enterprises, leading to an increase in the share of the credit to these small enterprises in the total credit to the business sector. This can be due to the fact that lenders become more experienced with credit evaluation and as time goes on, small enterprises with good track records, could benefit from a "reputation effect", thus easing a firm's access to credit. Moreover, as noted by the OECD (1995), enterprises' income statements improved in 1993 and 1994, and especially those of export-oriented enterprises. This credit reorientation could have softened the effect of credit contraction on the current account and on the level of general activity.

We have further analyzed the effects of finance variables on inflation. Indeed, the control of inflation is the other ultimate objective of monetary authorities. During the whole period, price stability was difficult to maintain given the deep transformations implemented. The liberalization of prices, which was already partially achieved, reached, at the end of the period, more than 90% of prices, weighted by the share in the consumer price index. The VAT system which was introduced in 1988-1989 was extended to a wide range of goods and the rates of VAT were unified and increased. Public tariffs were progressively increased. The majority of the liberalization measures implemented during the period had a direct or an indirect impact on the consumer price index. As a consequence, inflation strongly accelerated at the end of 1990 and during the first semester of 1991 even though Hungary never experimented hyperinflation like in Poland. Since 1992, price increases have been less frequent. However, inflation remains at a high level, maintaining the necessity to curb it.

As shown in Tables 9 and 10, we find that tight monetary policy reduces inflation. Moreover, we do not find a significant relation between prices and any credit aggregate. The positive effect of the spread on inflation might be explained by a hardening of credit market conditions.[23] The dramatic increase in the interest spread recorded in 1992 and the high level maintained in the following years could find its roots in the enactment of the New Banking Act in 1992 which required banks to reach the Cooke ratio at the end of the year. As a consequence of this tightening of the legislation, banks have restrained their riskier activities by lending to the state rather than to enterprises. Furthermore, they have tried to increase the profitability of new operations by decreasing the interest rate on deposits more rapidly than they do on new loans. All enterprises were thus confronted to a decrease in banking financing and under the assumption of supply-constraint, this could lead to an acceleration of inflation. Another plausible explanation for this result might be found in the countercyclical behavior of the mark-up. During a recession, firms have lower cash flow and greater difficulty raising external funds. Therefore, to increase current profits in order to meet their liabilities and finance investment, they increase their mark-up.[24]

[23] Results of a survey on the impediments to production in Hungary presented by Kopint-Datorg and quoted by Kornai (1995), show that the main impediments are insufficient demand and financing problems. OECD (1993), pp. 111, noted that the private entrepreneurs mentioned credit access as their main constraint.

[24] For the countercyclical behavior of mark-ups and capital market imperfections, see Chevalier and Scharfstein (1993).

Table 9: Dependent variable: Consumer price index, optimal lags: 6

Explanatory variables	Optimal lag	P-value of F	Sign of $\gamma(1)$	P-value
Lending Rate	1	0.01	-	0.01
Spread	6	0.04	+	0.01
Real Lending Rate	1	0.14	-	0.13
Real Spread	6	0.03	+	0.01

As illustrated by Table 10, the producer price index is also influenced by the real effective exchange rate which did not significantly affect the CPI. However, the sign of the relation is not significantly different from zero. The central bank has maintained, during the whole period, the stability of this real effective exchange rate as an operative objective of the monetary policy. It achieved this objective in 1990 and 1992 but a real appreciation took place in 1991 and 1993. During these two years, nominal depreciations of the Forint were insufficient to compensate the increase in the inflation differential.

Table 10: Dependent variable: Producer price index, optimal lags: 1

Explanatory variables	Optimal lag	P-value of F	Sign of $\gamma(1)$	P-value
Real effective exchange rate	6	0.01	-	0.78
Spread	6	0.00	+	0.02
Real Spread	6	0.01	+	0.03
Real Lending Rate	6	0.01	-	0.11

5. Conclusions

As we have discussed above, the amount and the structure of credit is relevant to explain Hungarian economic performance. These results are in line with those obtained by Calvo and Coricelli (1993). While they were interested in the links between credit and output performance in a point in time, we have addressed the question in a dynamic setup. Using time series data over the period 1990-1994, we find that the lending channel has been an active channel of the monetary transmission mechanism. Credit has been a driving force in economic activity. These results could come from the fact that during the period, firms have been mostly supply-constrained in credit markets.

We find that the current account performance was negatively affected by the credit contraction. Using disaggregated data on credit, we are able to show that credit to small enterprises is highly significant to explain current account as well as the level of unemployment. This highly significance does not mean that credit to small enterprises explains all the variations of the current account and the level of unemployment. Moreover, given the limited size of the sample, the regressions' results give only qualitative inferences but cannot be taken as precise measures of the impact of credit on real activity. Therefore, the fact that these variables have an information content on the evolution of economic activity does not imply that they can be used as instruments of monetary policy. Starting using them as instrument leads estimates' results subject to the Lucas' critics.

These results reinforce our inference that firms, at least the small ones, are supply-constrained. Indeed, small enterprises have no other external financial source than bank loans. Thus, the distinction between different credit aggregates seems to be very important in order to explain the evolution of the current account and economic activity, through the level of unemployment. To go further in this analysis, panel data with firms split according to their size and the markets they serve should be used. The effects of credit contraction on unemployment have been mitigated by the reallocation of credit. Credit to small enterprises increased from 3.8% of total credit to enterprises in 1990 to 10.2% in 1994.

Finally, we did not find a significant relation between credit aggregates and inflation, measured by the CPI or the PPI. In contrast, a restrictive monetary policy leads to a decrease in inflation. Moreover, using the spread between lending rates and deposit rates, as a proxy of the stance of credit markets, we show that increases in this spread, that is a tight credit market, has a positive impact on inflation.

Appendix 1

The data are published by the National Bank of Hungary in its monthly and annual reports. The description of data is the following:
DC: domestic credit stock including credit to enterprises, households and government,
CET: total credit to enterprises both private and state-owned,
CLE: credit to large enterprises ,
CSE: credit to small enterprises,
CG: credit to government and households,
RCDC: real domestic credit, deflated by the consumer price index,
RCCET: real total credit to enterprises, deflated by the consumer price index,
RCCLE: real credit to large enterprises, deflated by the consumer price index,
RCCSE: real credit to small enterprises, deflated by the consumer price index,
RCCG: real credit to government and households, deflated by the consumer price index,
RPDC: real domestic credit, deflated by the producer price index,
RPCET: real total credit to enterprises, deflated by the producer price index,
RPCLE: real credit to large enterprises, deflated by the producer price index,
RPCSE: real credit to small enterprises, deflated by the producer price index,
RPCG: real credit to government and households, deflated by the producer price index,
LR: lending rate defined as the weighted average of individual contracts concluded in the current month by the commercial banks and specialized financial institutions with enterprises and entrepreneurs under market conditions for loans maturing within one year,
SPD: interest spread defined as the difference between the interest paid on loans maturing within one year and the interest received on deposits fixed for less than one year, by the business sector,
RCLR: real lending rate, deflated by a moving average of consumer price index,
RCSPD: real interest spread, deflated by a moving average of consumer price index,
REER: real effective exchange rate as calculated by the National Bank of Hungary,
CA: current account in convertible currencies, in millions of US$,
IMPE: extended imports, measured as imports of goods and services plus expenditures from tourism, and expenditures from interest and financial investments,
EXPE: extended exports, measured as exports of good and services plus revenues from tourism, revenues from interests and financial investments and balance of unrequited transfers,
IP: industrial production index,
U: number of registered unemployed people,
CPI: consumer price index,
PPI: producer price index.

Appendix 2: Unit root tests

	Dickey-Fuller						Phillips-Perron					
Variable	C,T	Lag	C	Lag	-	Lag	C,T	Lag	C	Lag	-	Lag
CA	0.92	4	0.80	4			0.02	4	0.38	4		
ΔCA	0.12	3	0.03	3	0.00	3	0.00	3	0.00	3	0.00	3
DC	0.78	2	0.99	2			0.95	2	0.98	2		
ΔDC	0.54	2	0.30	2	0.48	6	0.01	2	0.00	2	0.00	6
CLE	0.96	2	0.96	2			0.98	2	0.93	2		
ΔCLE	0.21	2	0.08	2	0.00	2	0.00	2	0.00	2	0.00	2
CSE	0.31	5	0.16	5			0.91	5	0.72	5		
ΔCSE	0.64	4	0.48	4	0.07	4	0.01	4	0.00	4	0.00	4
CET	0.94	2	0.93	2			0.94	2	0.89	2		
ΔCET	0.28	2	0.09	2	0.00	2	0.00	2	0.00	2	0.00	2
IP	0.24	6	0.71	4			0.75	6	0.38	4		
ΔIP	0.27	3	0.10	3	0.00	3	0.00	3	0.00	3	0.00	3
U	0.07	6	0.81	6			0.97	6	0.45	6		
ΔU	0.95	4	0.16	6	0.00	5	0.01	4	0.54	6	0.05	5
Δ^2U	0.02	6	0.06	5	0.00	5	0.00	6	0.00	5	0.00	5
REER	0.67	3	0.50	3			0.70	3	0.58	3		
ΔREER	0.25	2	0.07	2	0.00	2	0.03	2	0.00	2	0.00	2
CPI	0.91	6	0.82	6			0.59	6	0.95	6		
ΔCPI	0.55	6	0.25	6	0.39	5	0.02	6	0.00	6	0.00	5
PPI	0.57	6	0.96	6			0.58	6	0.96	6		
ΔPPI	0.58	6	0.25	6	0.57	6	0.00	6	0.00	6	0.00	6
SPD	0.95	2	0.30	6			0.99	2	0.65	6		
ΔSPD	0.16	2	0.28	3	0.00	2	0.00	2	0.00	3	0.00	2
LR	0.96	3	0.62	3			0.99	3	0.83	3		
ΔLR	0.58	2	0.35	2	0.02	2	0.22	2	0.06	2	0.00	2
RCDC	0.92	4	0.76	4			0.88	4	0.70	4		
ΔRCDC	0.28	6	0.11	3	0.00	2	0.03	6	0.00	3	0.00	2
RCCE	0.92	2	0.80	2			0.96	2	0.93	2		
ΔRCCLE	0.24	2	0.08	2	0.00	2	0.00	2	0.00	2	0.00	2
RCCSE	0.28	5	0.59	5			0.90	5	0.66	5		
ΔRCCSE	0.24	2	0.08	2	0.00	2	0.00	2	0.00	2	0.00	2
RCCET	0.89	2	0.86	2			0.94	2	0.94	2		
ΔRCCET	0.30	2	0.09	2	0.00	2	0.00	2	0.00	2	0.00	2
RSPD	0.97	2	0.39	6			0.99	2	0.71	6		
ΔRSPD	0.11	2	0.33	3	0.0	2	0.00	2	0.00	3	0.00	2
RLR	0.05	6	0.65	2			0.50	6	0.74	2		
ΔRLR	0.39	6	0.11	6	0.00	2	0.00	6	0.00	6	0.00	2
RPDC	0.88	2	0.80	2			0.93	2	0.83	2		
ΔRPDC	0.26	2	0.07	2	0.00	2	0.00	2	0.00	2	0.00	2
RPCLE	0.87	6	0.81	2			0.90	6	0.92	2		
ΔRPCLE	0.31	2	0.10	2	0.00	2	0.00	2	0.00	2	0.00	2
RPCSE	0.27	5	0.03	5			0.91	5	0.41	5		
ΔRPCSE	0.65	4	0.50	4	0.03	4	0.01	4	0.00	4	0.00	4
RPCET	0.90	2	0.85	2			0.93	2	0.92	2		
ΔRPCET	0.36	2	0.12	2	0.00	2	0.00	2	0.00	2	0.00	2

Figures under the heading C,T are the p-value of the DF and Phillips Perron statistic for the null hypothesis of unit root when the model is estimated with constant and trend. The figures under the heading C correspond to the model estimated with constant but without trend. The 5th and 10th column correspond to the model estimated without constant and trend.

Appendix 3: lags of dependent and Explanatory variables are chosen simultaneously

	Optimal lag CA	Optimal lag indep. var.	P-value of F	Sign of the sum of coef.	P-value
DC	2	3	0.01	-	0.31
CET	1	4	0.00	+	0.06
CLE	2	3	0.00	+	0.08
CSE	2	3	0.03	+	0.19
CG	1	4	0.00	-	0.04
RCDC	2	1	0.10	-	0.09
RCCET	1	4	0.01	+	0.12
RCLE	1	4	0.02	+	0.15
RCCSE	2	3	0.01	+	0.25
RCCG	1	4	0.00	-	0.04
RPDC	1	0	n.s.	n.s.	n.s.
RPCET	1	4	0.00	+	0.05
RPCLE	1	4	0.00	+	0.05
RPCSE	2	3	0.03	+	0.21
RPCG	2	3	0.00	-	0.09
LR	2	5	0.00	+	0.01
SPD	2	3	0.01	-	0.06
RCLR	2	1	0.07	+	0.06
RCSPD	2	3	0.01	-	0.05

	Optimal lag IMPE	Optimal lag indep. var.	P-value of F	Sign of the sum of coef.	P-value
DC	1	3	0.36	-	0.94
CET	5	3	0.01	+	0.85
CLE	5	3	0.01	+	0.71
CSE	5	3	0.05	-	0.85
CG	1	3	0.54	-	0.93
RCDC	1	3	0.81	-	0.84
RCCET	5	3	0.03	-	0.78
RCLE	5	3	0.03	-	0.90
RCCSE	5	3	0.07	-	0.65
RCCG	1	3	0.79	-	0.90
RPDC	3	0	n.s.	n.s.	n.s.
RPCET	5	3	0.06	-	0.88
RPCLE	5	3	0.06	-	0.99
RPCSE	5	3	0.06	-	0.82
RPCG	2	0	n.s.	n.s.	n.s.
LR	1	3	0.64	+	0.66
SPD	5	2	0.06	+	0.04
RCLR	5	4	0.03	-	0.10
RCSPD	5	2	0.09	+	0.07

	Optimal lag EXPE	Optimal lag indep. var.	P-value of F	Sign of the sum of coef.	P-value
DC	0	4	0.37	-	0.58
CET	2	1	0.02	+	0.02
CLE	2	1	0.03	+	0.03
CSE	2	1	0.03	+	0.03
CG	2	1	0.04	-	0.03
RCDC	0	4	0.36	-	0.35
RCCET	2	1	0.10	+	0.10
RCLE	0	4	0.40	+	0.59
RCCSE	2	1	0.05	+	0.05
RCCG	2	1	0.02	-	0.02
RPDC	0	4	0.58	-	0.96
RPCET	2	1	0.01	+	0.00
RPCLE	2	1	0.01	+	0.01
RPCSE	2	1	0.01	+	0.01
RPCG	0	4	0.71	-	0.55
LR	2	4	0.00	+	0.01
SPD	2	3	0.00	-	0.62
RCLR	0	4	0.18	+	0.34
RCSPD	2	3	0.00	-	0.51

The optimal lag for the unemployment variable and explanatory variable is zero for all tested relations expect those presented in the following table:

	Optimal lag U	Optimal lag indep. var.	P-value of F	Sign of the sum of coef.	P-value
CSE	0	2	0.00	-	0.31
CG	0	1	0.06	+	0.06
RCCSE	0	2	0.00	-	0.17
RPDC	0	2	0.06	+	0.24
RPCET	0	1	0.04	-	0.04
RPCLE	0	1	0.08	-	0.08
RPCSE	0	2	0.00	-	0.26

	Optimal lag CPI	Optimal lag indep. var.	P-value of F	Sign of the sum of coef.	P-value
SPD	6	6	0.04	+	0.01
LR	6	1	0.01	-	0.01
RCSPD	6	6	0.03	+	0.01
RCLR	5	1	0.02	-	0.01

	Optimal lag PPI	Optimal lag indep. var.	P-value of F	Sign of the sum of coef.	P-value
SPD	5	3	0.00	+	0.06
LR	5	1	0.06	-	0.05
RCSPD	5	3	0.00	+	0.08
RCLR	5	6	0.01	-	0.12
REER	4	6	0.00	-	0.14

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