A Money-Market and Credit-Market Model of the Determination of the Interest Rate and the Price Level

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Over the past four decades much intellectual effort has gone into the estimation of money demand relationships. *Friedman's* contributions (e.g. *Friedman,* 1956) can be viewed as the trigger for the renewed interest in the money demand relationship. The objective of researchers has mostly been to find historically stable relationships between the quantity of money (often deflated) and a set of explanatory variables among which the interest rate and income figure prominently. *Friedman's* as well as *Meltzer's* (1963) interest in the subject was primarily the search for effective price level control. These authors interpret their work on money demand as an extension of the quantity theory of money, i.e. as a contribution to a theory of the price level.

This price level theory can be discussed by considering a money demand function where the deflated money stock is a function of real income and the interest rate. This equation is solved for the price level because the nominal money stock, real income and the interest rate are regarded as determinants of the price level. The price level emerges as a homogeneous function of degree one in the money stock, a positive function of the interest rate and a negative function of real income.[1] The following (modern) quantity-theoretical propositions rest on this equation and make a statement about the relationship between the money stock, the interest rate, and real income: First, in the long run changes in the money stock leave the interest rate and real income unaffected while the price level adjusts proportionally to the increase in the money stock. In the short run an increase in the money stock can lower the interest rate (the so-called liquidity effect) and raise real income. Secondly, both the interest rate and real income can change for non-monetary reasons. Such variations cause changes in the price level. When effects of the second kind are at work money growth and inflation, even when averaged over several years, do not move parallel. In the discussion of monetary policy this is often and wrongly interpreted as instability of the money demand relationship. Hence, when inflation seems to run independently of money growth this should not be taken as a reliable sign that money (or a particular definition of the money stock) has become irrelevant for the course of inflation or that a change in the parameters of the money demand function has occurred.

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[1] Formally, we have a money demand function $\frac{M}{P} = \gamma_0 I^{\gamma_1} \cdot Y^{\gamma_2}$ with $\gamma_1 < 0, \gamma_2 > 0$. The variables are M, the nominal money stock, P, the price level, Y, real income and I, the interest rate. If we take logs of the variables (denoted by lower-case letters) and solve for the price level we obtain $p = m - \gamma_0 - \gamma_1 i - \gamma_2 y$.

In empirical work researches have emphasized that the so-called price level adjustment approach to money demand discussed above should be used in a particular historical episode only if the prerequisite of exogenous nominal money is fulfilled. Which monetary arrangements satisfy this condition is still a matter of debate. *Fama's* (1982) and *Mehra's* (1988) results show that despite the important role of interest rate stabilization in U.S. monetary policy this type of equation explains movements of the price level well[2]. Theoretically, the requirement for the applicability of the price level adjustment approach can certainly not be that the money stock should be unaffected by the public's behavior. Rather, it is that the monetary authority can influence the money stock (e.g. in a small economy this rules out a regime of permanently fixed exchange rates) and that the price level is free (e.g. not centrally controlled) to adjust. In this perspective, Switzerland's monetary arrangement seems to lend itself to the application of a modern quantity theory of prices. In 1973 the Swiss National Bank switched from pegging the dollar to controlling the monetary base and in 1975 adopted targets for M1. In 1980 the procedure was changed, and since then the monetary base has been targeted directly.

In a recent paper (*Rötheli*, 1990) I estimated a price level adjustment equation by using a Pascal lag procedure for the period 1980 to 1987. The most striking result of this study is that, besides the money supply, the interest rate is important for the course of the price level. In the present article I endogenize the interest rate and investigate, in keeping with the two quantity theoretical propositions outlined, the role of the liquidity effect and the role of non-monetary factors in the interplay of the interest rate and the price level. For this purpose I develop a minimal dynamic model of the simultaneous determination of the money stock, the interest rate and the price level. The money stock is pinned down to the variable the central bank actually controls, the level of reserves. I maintain the price level adjustment concept of the money market and add a credit market. The simultaneous treatment of the money market and the credit market resembles the study by *Niehans/Schelbert-Syfrig* (1966). The model makes explicit what *Greenfield/Yeager* (1986) and *Laidler* (1987) mean by maintaining that the interest rate is determined in the credit market and that the interest rate does not equilibrate the money market.

In the empirical section of the paper the model is estimated for Switzerland over a period with virtually no change of monetary procedures.[3] The estimated model is then used for two simulation experiments. The main results of these are: First, a money supply impulse leads to a substantial and long-lasting liquidity effect of the interest rate. A corollary of this is that five years after a permanent one percent increase in the money supply the price level has increased by only half a percent. Secondly, a credit supply impulse, e.g. a change in the foreign interest rate, leads to a cumulative effect on

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[2] *Bordo* et al. (1987) demonstrated that even a procedure of interest-rate control (as used in Canada) does not mean that the nominal money stock is demand-determined.

[3] The period studied ranges from 1980 to 1987. The 1987/88 and the 1988/89 issues of the OECD Economic Surveys of Switzerland describe the important regulatory and institutional changes that have affected Swiss monetary policy since the beginning of 1988.

the interest rate and the price level. The corresponding long-run effect on the domestic interest rate is roughly four times greater than the estimated impact effect.

1. Elements of Theory

The model developed in the following two sections is a financial one in that it incorporates influences of real income but does not deal with feedbacks to real income.[4] The first element is the supply of money and credit. We assume that the monetary variable which causes the price level is the quantity of sight deposits which makes up roughly two-thirds of M1. Estimates for Switzerland show that M1 explains a larger portion of the price level variations than the monetary base and thus do not confirm the findings for the U.S. reported by *Fama* (1982) and *Boschen* (1988), who deny a role of inside money in the determination of inflation.[5] The currency part of M1 is dropped because the Swiss National Bank largely accommodates fluctuations in the public's demand for currency.[6]

The supply of money (sight deposits) is thus easy to model. Consider a simplified bank balance sheet (which ignores net worth) with three assets: reserves, R, loans to domestic customers, E, loans to foreigners, E^*, and two liabilities: sight deposits, M and time deposits, T. In our analysis we do not distinguish between loans and bonds. Sight deposits are the transactions medium and do not earn interest, while time deposits are interest-bearing. Banks hold reserves because for the individual bank there is a risk of reserve loss due to unexpected cash withdrawals. The balance sheet constraint is thus $R + E + E^* = M + T$. Assuming that the banks hold an interest-sensitive portion (f) of their assets in reserves, we have $R = f(I) \cdot (M + T)$ with $\frac{\partial f}{\partial I} < 0$ and $0 < f \leq 1$. The public's holding of M and T is interest-sensitive; we can summarize it by the function $T = t(I) \cdot M$ with $\frac{\partial t}{\partial I} > 0$. Thus, the money supply is $M = h(I) \cdot R$, where $h(I) = \{f(I) \cdot [1 + t(I)]\}^{-1}$ and $\frac{\partial h}{\partial I} \gtrless 0$. Banks allocate their credit funds between domestic and foreign customers, depending on the domestic interest rate and the foreign interest rate, I^*. This can be written as $E^* = u(I, I^*) \cdot E$ with $\frac{\partial u}{\partial I^*} > 0$, $\frac{\partial u}{\partial I} < 0$. Correspondingly, the domestic credit supply is $E = e(I, I^*) \cdot R$ with $e(I) = [1 - f(I)] \cdot \{f(I)[1 + u(I, I^*)]\}^{-1}$ and $\frac{\partial e}{\partial I} > 0$, $\frac{\partial e}{\partial I^*} < 0$.

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[4] *Rötheli* (1986) reported evidence for a transitory effect of monetary shocks on real gross domestic product that appears after about one year and peaks after more than two years.

[5] For Switzerland, M1 also beats M2 and M3 in explaining inflation, see *Rötheli* (1990).

[6] In this regard, the Swiss National Bank's policy (at least during the eighties) very much resembles the policy of the Federal Reserve System. See *Boschen* (1988) for references with respect to the U.S. and a discussion of currency accommodation, inside money, and price level determination. In this study the dropping of currency as a part of the money supply is also a matter of theoretical convenience. Empirically speaking, M1 and sight deposits perform about equally well in explaining Swiss inflation between 1980 and 1987.

The next step is to determine the interest rate. Like *Brunner/Meltzer* (1964) I model a function for domestic credit demand (with the interest rate, the price level and real income, Y, as determinants) and assume that the credit market is always in equilibrium. In order to investigate the effect of different impulses on the system, it is assumed that the price level cannot move instantaneously. With a temporarily fixed price level the interest rate equilibrates the credit market. Given the interest rate and the level of reserves, the nominal money stock is determined through the described money supply relationship. This supply relationship incorporates a choice for the public between sight deposits and time deposits. However, this influence of the public on the determination of the money stock does not imply that the quantity of money is always on the level the public wants to maintain in the long run. The money stock the public aims at maintaining in the long run is a function of the interest rate, the price level and real income. At the initial price level, a shock to the supply of reserves or to credit supply opens a gap between money supply and money demand. This gap in money balances is removed over time, as the price level adjusts towards its equilibrium.[7]

2. The Model

This section contains an explicit model that takes into account all the points introduced in the previous section. Parameters for the intercepts are suppressed, and lower case letters denote the logs of variables. The quantities of money and credit are measured in nominal terms.

The supply of credit is written compactly as:[8]

$$E_t^s = R_t \cdot \left(\frac{I_t}{I_t^*}\right)^{\alpha_1} \qquad \alpha_1 > 0 \tag{1}$$

Credit demand is:

$$E_t^d = P_t \cdot I_t^{\beta_1} \cdot Y_t^{\beta_2} \qquad \beta_1 < 0, \quad \beta_2 > 0. \tag{2}$$

The equilibrium condition for the credit market is:

$$E_t^s = E_t^d \tag{3}$$

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[7] *Patinkin* (1965) and *Laidler* (1987) regard the price level as the equilibrating variable in the money market.

[8] I abstract from expected inflation so that there is no distinction between the real and the nominal interest rate. Similarly, I do not consider expected exchange rate changes that would add a further element to the linkage of international credit markets. The domestic interest rate could easily be adjusted for the international risk difference by a multiplicative risk term. A risk term would add a further element to the interest rate equation that follows.

Therefore, the equilibrium interest rate is:

$$i_t = \frac{1}{\beta_1 - \alpha_1}(r_t - p_t) + \frac{\alpha_1}{\alpha_1 - \beta_1}i_t^* + \frac{\beta_2}{\alpha_1 - \beta_1}y_t \tag{4}$$

The quantity of money is determined through the supply relationship:

$$M_t = M_t^s = R_t \cdot I_t^{\varphi_1} \qquad \varphi_1 \gtrless 0 \tag{5}$$

The demand for money is:

$$M_t^d = P_t \cdot I_t^{\gamma_1} \cdot Y_t^{\gamma_2} \qquad \gamma_1 < 0, \quad \gamma_2 > 0 \tag{6}$$

A disequilibrium situation is removed through the adjustment of the price level:

$$p_t - p_{t-1} = \lambda(m_{t-1}^s - m_{t-1}^d) \qquad \lambda > 0 \tag{7}$$

Combining the equations (6) and (7) leads to the following formula for the inflation rate:

$$p_t - p_{t-1} = \lambda(m_{t-1} - p_{t-1}) - \lambda\gamma_1 i_{t-1} - \lambda\gamma_2 y_{t-1} \tag{7'}$$

The stability conditions for this model are relatively simple. First, λ has to be positive as indicated. Secondly, inspection of the first-order difference equation in p [resulting from inserting equation (4) into equation (7')] leads to the further condition $\frac{\gamma_1}{\beta_1 - \alpha_1} < 1$. This means that the product of the elasticity of the interest rate with respect to real reserves and the interest elasticity of money demand must be less than unity. The intuitive meaning of this becomes clear when we consider the case of an increase in bank reserves: the induced money supply increase (equal to unity) has to be larger than the induced money demand increase (equal to $\frac{\gamma_1}{\beta_1 - \alpha_1}$), otherwise the price level and the interest rate would sink towards zero.

In the following we shall use the model to study the effects of two impulses on the system. First, a step increase in the supply of reserves, i.e. an expansionary monetary policy in considered. Secondly, we shall investigate the effects of a decrease in credit supply. The increase in the supply of reserves can be analyzed with charts for the credit market and the money market. Chart 1 shows the credit market. The interest rate as the price of credit is on the vertical axis. Credit supply, the upward sloping curve, shifts to the right e.g. when an increase in the supply of reserves occurs. Similarly, credit demand shifts to the right when the price level rises. Chart 2 shows the money market. The inverse of the price level, i.e. the relative price of money, is on the vertical axis. In this framework, money demand is a rectangular hyperbola which shifts e.g. as changes in the interest rate occur.[9] For the graphical illustration we assume that the two opposing

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[9] *Patinkin* (1965, 49) prefers the term market-equilibrium curve for this function. This curve connects points which associate a quantity of money in the economy with the corresponding equilibrium level of money prices.

effects of the interest rate on the money supply, as described in section 1, cancel each other out ($\varphi_1 = 0$) and the money stock is only a function of the level of reserves. Hence, money supply is a vertical line that shifts only when the supply of reserves changes.

The central bank increases the level of reserves by purchasing bonds from banks. As a result of the increase in reserves the supply of credit moves to the right, and the interest rate falls from I_0 to I_1. In the money market both supply and demand are affected: supply shifts to the right and demand moves in the same direction because of the lowered interest rate. Since the price level is temporarily fixed at P_0 the new position of the graphs indicates a disequilibrium in the money market with a real balance surplus $\widetilde{M}$.[10] The equilibrating adjustment moves the price level towards P_1, which is the equilibrium price level provided the interest rate does not change further. However, the induced upward movement of the price level ($\frac{1}{P}$ falls) shifts credit demand to the right, triggering an increase in the interest rate. This in turn lowers money demand. In this way the two markets keep interplaying till the interest rate has moved back to its initial level and the price level is bid to P_2, where the long-run equilibrium is reached. At P_2 the price level has adjusted proportionally to the increase in reserves.

The effects of a decrease in credit supply are shown in Chart 3 and Chart 4. A possible source for the shift of E^s to $'E^s$ is an increase in the foreign interest rate. At the given price level P_0 the decrease in credit supply pushes up the interest rate from I_0 to I_1. As a result, money demand falls and a real balance surplus $\widetilde{M}$ is created. The induced price level rise (towards P_1) moves credit demand to the right. The interest rate and price level effects reinforce each other (money demand shifts leftwards, credit

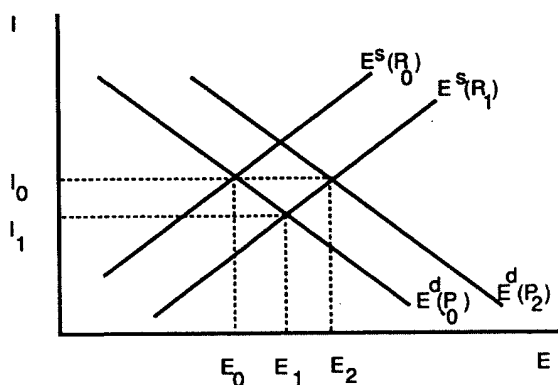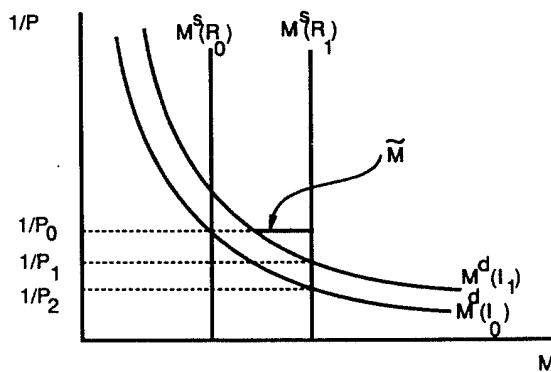*Chart 1:* The Reaction of the Credit Market to an Increase in the Supply of Bank Reserves

Chart 2: The Reaction of the Money Market to an Increase in the Supply of Bank Reserves

[10] The real balance surplus in the money market has as its counterpart an excess demand in the commodities market, which is not modeled separately. In the IS/LM model the assumptions of continual equilibrium in the commodities market and the bond market rule out a disequilibrium in the money market.

Chart 3: The Reaction of the Credit Market to a Decrease in the Supply of Credit
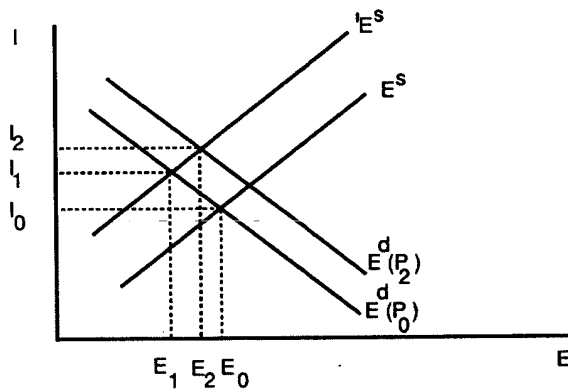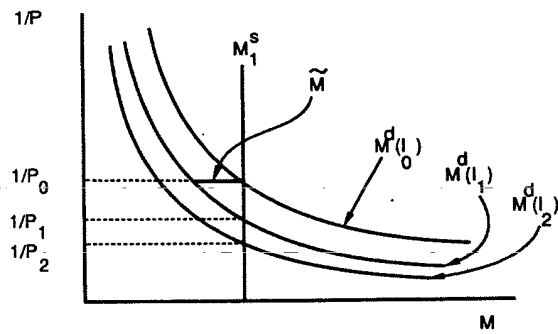
Chart 4: The Reaction of the Money Market to a Decrease in the Supply of Credit

demand shifts rightwards) till the new equilibrium is reached with I_2 and P_2. The outcome is similar when credit demand increases.

3. Estimation and Identification

Equations similar to equation (7') are known under the heading of price-level adjustment approach to the estimation of money demand. This reduced-form money market equation can be estimated on its own. However, if we want to know how the interplay of the money market and the credit market affects the price level we also have to estimate equations for the interest rate and the money stock. The interest rate equation is equation (4), the reduced-form credit market relationship. The equation for the quantity of money is the money supply function (5).

The equations are estimated in logs of the variables and with quarterly data. The interest rate is the yield on long-term government bonds. Further variables used are real gross domestic product for Y, the German interest rate I^G as the foreign interest rate, the consumer price index for P, and seasonally unadjusted deposits of the private sector with the Swiss National Bank for R.[11] The interest rate equation is estimated in first differences of all the variables.[12] The money supply equation is also estimated in first differences. The price level equation is specified as a partial-adjustment equation. The adjustment process of the form $\Delta x_t = x_t - x_{t-1} = \lambda(x_{t-1}^* - x_{t-1})$ works better than the one with contemporaneous explanatory variables (x_t^*).[13]

[11] The reserves data are daily averages which include month-end credit to commercial banks.

[12] I use nominal interest rates since the construction of measures of the real interest rate needs additional (debatable) assumptions, especially for the long-term interest rates used here. Nevertheless, the interest rate equation is estimated in differenced form and with a constant term. This specification accounts for different (inflation) premiums in Swiss and German interest rates provided these only change as a function of time.

[13] The sum of squared residuals is lower.

In the case of the above-described dynamic specification the residuals of the interest rate equation and the price level equation are correlated with the regressors of the respective equation. E.g. last period's interest rate shock is part of this period's residual of the Δi equation and affects this period's inflation, which figures in the Δi equation. Moreover, the residual of the Δp equation is correlated with p_{t-1} if this equation results from a Koyck transformation of a stochastic equation in p.[14] In order to avoid simultaneous equation bias the equations are estimated with the instrumental variables method. The instruments used are the contemporaneous and lagged exogenous variables (i.e. bank reserves, the German interest rate, real gross domestic product), a time trend, a constant, and seasonal dummies. The structural parameters of the credit market model are exactly identified on the stated assumptions that the foreign interest rate affects only the credit supply and that real income affects only credit demand. They can be determined from the coefficients of the interest rate equation (4). The parameter φ_1 can be estimated directly by using the money supply function (5). The structural parameters of the money market model can be calculated from the estimated coefficients of the inflation equation (7').

Table 1 shows the estimates. In the interest rate equation the inclusion of lagged real reserves improves the estimate significantly. This is not the case for real gross domestic product and the German interest rate. The coefficient of the German interest rate is significantly lower than one.[15] The money supply function implies full adjustment within two quarters after a change in reserves. An F-test applied to the money supply equation indicates that restricting the sum of the coefficients of the reserves to one is justified. From the significance of the lagged reserves term in the money supply equation I conclude that the lag found in the interest rate equation is due to a lag in the credit supply process and is not a sign of slow interest rate adjustment: since the credit supply and the money supply are closely related, they should react with a similar lag to an increase in bank reserves. An interest rate term in the money supply function is not significant and is therefore dropped. Hence, the simplification adopted

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[14] This can be expressed in the following way: Equation (5) and (6) define an equilibrium price level $p^* = m - \gamma_1 i - \gamma_2 y$. If p adjusts towards p^* according to

$$p_t = \lambda \sum_{i=0}^{\infty} (1 - \lambda)^i p_{t-1-i}^* + \varepsilon_t,$$

then the following partial-adjustment equation $p_t - p_{t-1} = \lambda(p_{t-1}^* - p_{t-1}) + u_t$ is implied. This is the adjustment process that is used in this article. As described by *Maddala* (1977, 360/361) the u_t will only be serially uncorrelated under a very restrictive condition. Whenever this condition does not hold, the use of OLSQ will lead to a downward based estimation of λ i.e. to an overestimation of adjustment lags. Note that in the context of this article $1 - \lambda$ equals Maddala's λ. Incidentally, the λ of our price level equation estimated with OLSQ is 0.062 compared to the result presented in Table 1 and footnote 17 ($\lambda_{INST} = 0.084$).

[15] The estimates of the structural parameters of the credit market are: $\hat{\alpha}_1 = 0.298$, $\hat{\beta}_1 = -0.806$ and $\hat{\beta}_2 = 2.413$.

for the charts $(\varphi_1 = 0)$ is warranted.[16] The price level adjusts very slowly to changes in its determinants. The estimated adjustment speed is comparable to the findings of *Wasserfallen* (1985) and *Rötheli* (1990).[17] Due to the lagged real reserves in the interest rate equation, inspection of stability involves calculation of the two roots of the second-order difference equation in p. The dominant root of this equation is actually less than unity, as required. Thus, the estimated parameters fulfill the stability conditions.

Table 1: Estimates of equations for the interest
rate, the money supply and the price level
(Sample period: 1980:1 – 1987:4)*

$$\Delta i_t = -0.013 - 0.495\,(\Delta r_t - \Delta p_t) - 0.411\,(\Delta r_{t-1} - \Delta p_{t-1}) + 2.186\,\Delta y_t + 0.270\,\Delta i_t^G$$
$$\quad\quad (1.77)\quad (2.62)\quad\quad\quad\quad (2.61)\quad\quad\quad\quad\quad (3.46)\quad\quad (2.49)$$

$$\overline{R}^2 = 0.62 \quad DW = 2.06 \quad SEE = 0.034$$

$$\Delta m_t = 0.006 + 0.612\,\Delta r_t + 0.388\,\Delta r_{t-1}$$
$$\quad\quad (1.91)\quad (6.62)\quad\quad (6.62)$$

$$\overline{R}^2 = 0.77 \quad DW = 1.69 \quad SEE = 0.018$$

$$\Delta p_t = -0.179 + 0.084\,(m_{t-1} - p_{t-1}) - 0.037\,\dot{y}_{t-1} + 0.069\,i_{t-1}$$
$$\quad\quad (0.35)\quad (2.93)\quad\quad\quad (1.32)\quad\quad (3.67)$$

$$\overline{R}^2 = 0.37 \quad DW = 1.93 \quad SEE = 0.006$$

*Absolute values of t-statistic in parentheses.

[16] The first two equations are estimated with quarterly dummies which significantly reduce their sums of squared residuals. In both cases the coefficients of the three seasonal dummies are restricted to zero so that the constant term in Table 1 shows the average change per quarter.

[17] The estimates of the structural parameters of the money market are: $\hat{\lambda} = 0.084$, $\hat{\gamma}_0 = 2.131$, $\hat{\gamma}_1 = -0.821$ and $\hat{\gamma}_2 = 0.440$.

4. Simulations

We are now able to simulate the effects of an increase in the supply of reserves and the effects of a decrease in credit supply. For this purpose, a set of equilibrium values of the endogenous variables is computed on the basis of the estimated coefficients and the sample means of the exogenous variables. The estimated equations for the money stock and the interest rate are in first differences. Hence, the respective sample mean of the level of these two variables is used as the initial equilibrium value. In the first experiment we increase the level of reserves by five percent. In the second experiment we investigate a credit supply shock that raises the interest rate by five percent. An interest rate increase of this magnitude corresponds to an increase in the German interest rate by 18.5 percent.

Chart 5 shows the response of the money stock, the interest rate and the price level to the reserve supply increase. The initial equilibrium level of all variables is standardized to unity, and a change of 0.01 indicates a one percent change. The dashed lines indicate the new long-run equilibrium values of the variables. The most interesting feature of the interest rate path is the long-lasting liquidity effect. The liquidity effect is transitory, but it disappears only when the price level reaches its new equilibrium.[18] The upward pressure of the monetary expansion on the price level is partly offset by the liquidity effect, as we have seen in the diagrammatic exposition of section 2. Hence, the strong liquidity effect and the slow adjustment of the price level reinforce each other. The simulation indicates that even after six years the price level adjustment is by no means proportional to the increase in the supply of reserves.
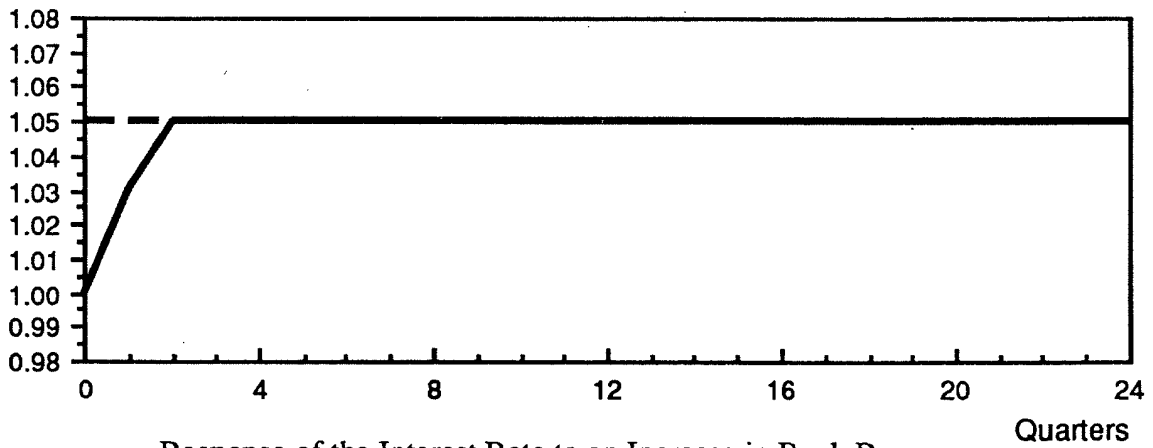
Chart 6 shows the response of the interest rate and the price level to a credit supply decrease. The money supply remains constant since it is not influenced by the interest rate. The initial rise in the interest rate leads to a real balance surplus and drives up the price level. The reinforcing effects of increases in the interest rate and the price level (as discussed in section 2) show up strongly in the simulated adjustment paths. The long-run reaction of the interest rate to a credit supply impulse is almost four times larger than the impact effect.[19]

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[18] The liquidity effect is transitory because the money supply is homogeneous of degree one with respect to reserves and the price level is homogeneous of degree one with respect to the money stock. Thus, in the long run the level of deflated reserves (the determinant of the interest rate) is neutral to changes in the level of reserves.
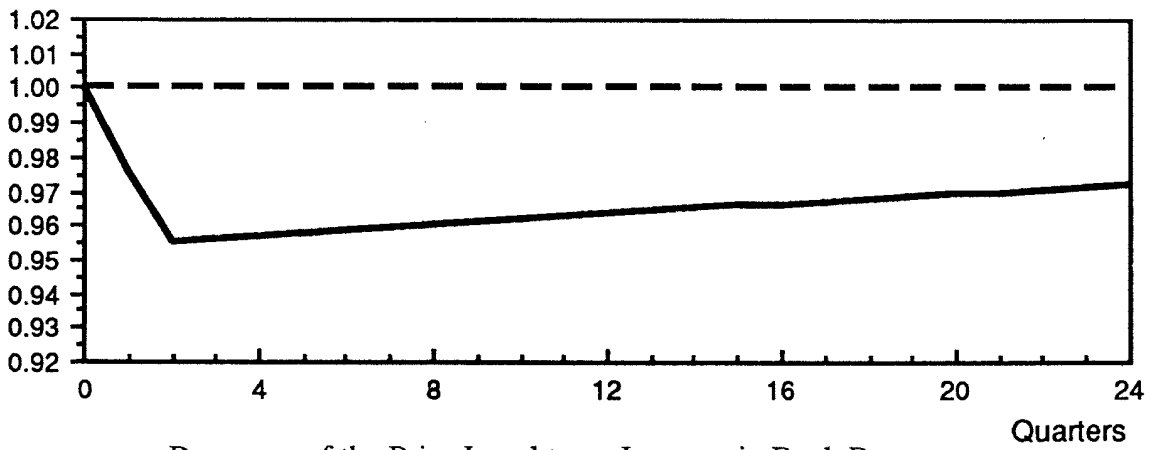
[19] The long-run elasticity of the domestic interest rate with respect to the German interest rate is 1.05.

Chart 5:

Response of the Money Stock to an Increase in Bank Reserves

Response of the Interest Rate to an Increase in Bank Reserves

Response of the Price Level to an Increase in Bank Reserves
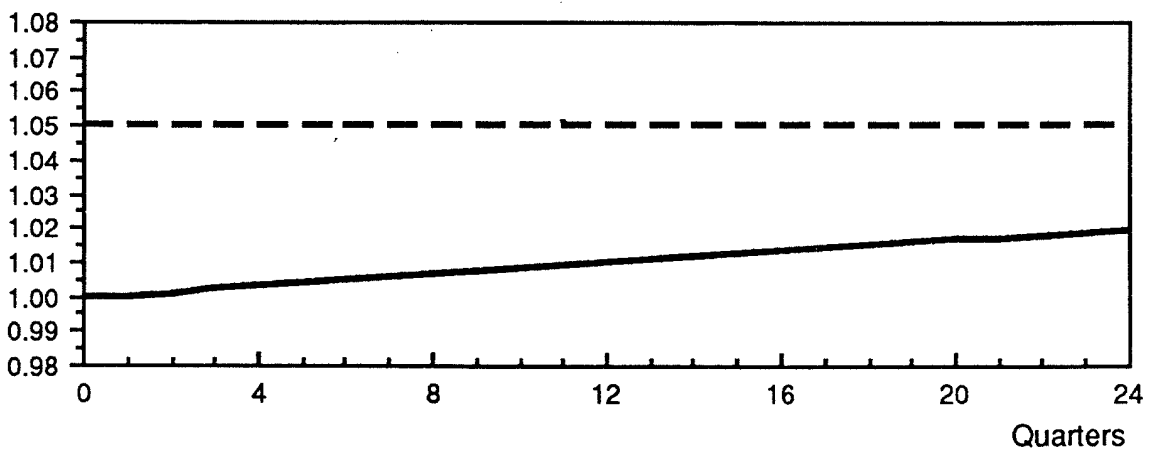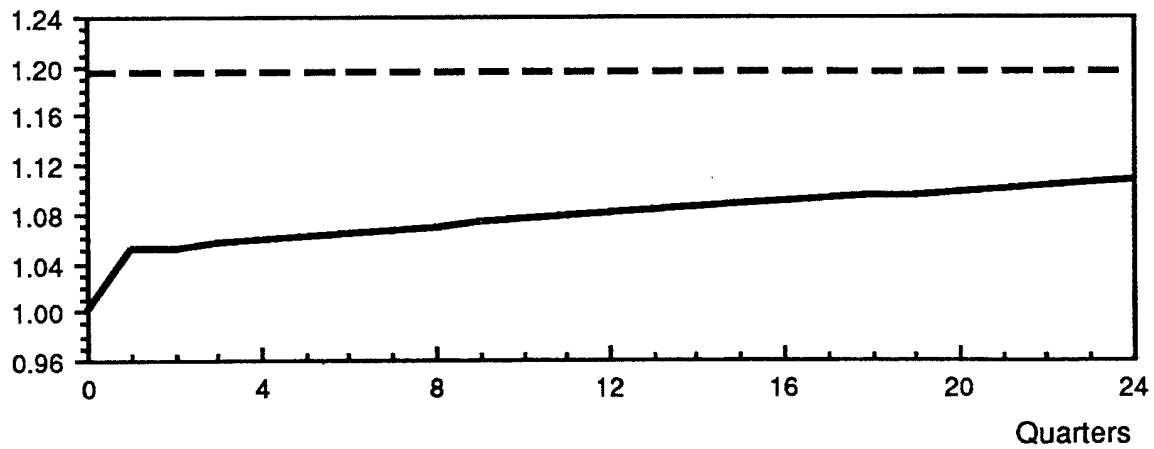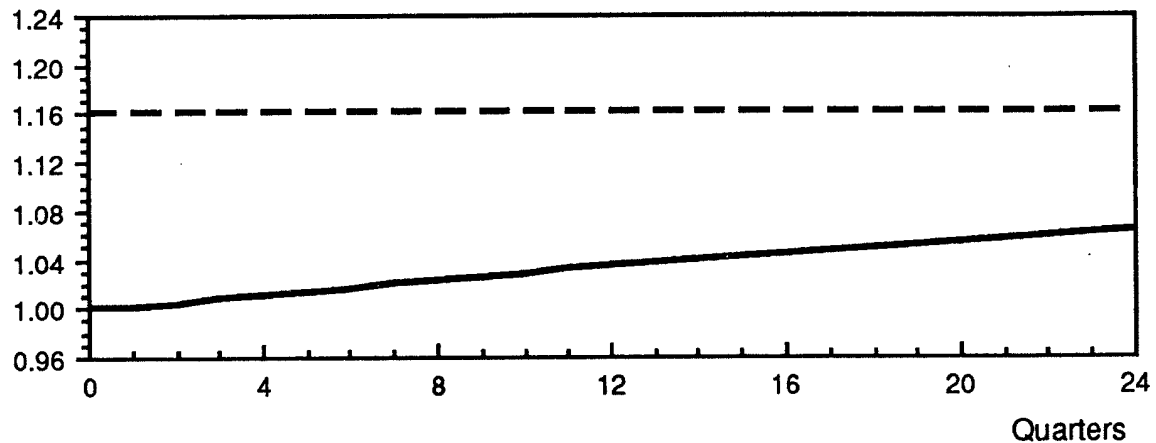
Chart 6:

Response of the Interest Rate to a Decrease in Credit Supply

Response of the Price Level to a Decrease in Credit Supply

The results of this simulation exercise have to be interpreted cautiously. First, the sample period over which the equations were estimated is rather short. Secondly, the relevant estimated coefficients are all significantly different from zero but still have substantial standard errors. This is important because small changes in the reserve elasticity of the interest rate or in the adjustment speed of the price level have strong cumulative effects and substantially accelerate or slow down the dynamic adjustment of the interest rate and the price level.

5. Summary and Conclusions

This article shows that substantial permanent changes in the price level not connected to money supply changes can be explained by a model maintaining the assumption of a stable money demand relationship. Changes affecting the credit market, and hence

the interest rate, have strong effects on the equilibrium price level. For Switzerland, a country facing substantial international integration of its credit market, I have shown that a change in the foreign interest rate induces substantial price level changes over several years. This inflationary (or deflationary) phenomenon challenges the view that steadying the growth path of the money supply guarantees stable inflation.

At present, the growing emphasis on private property and market mechanisms in eastern European countries is producing internationally rising returns on investment and rising interest rates. It is likely that this will keep the Swiss interest rate elevated for an extended period. In the light of this development it seems indicated for Switzerland to maintain a restrictive monetary policy. Even zero money supply growth can be inflationary under such circumstances.

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Summary

A Money-Market and Credit-Market Model of the Determination of the Interest Rate and the Price Level

A simultaneous model of the money market and the credit market is used to investigate the role of the liquidity effect and the role of non-monetary factors in the interplay of the interest rate and the price level. The model makes explicit what authors like Laidler mean by maintaining that the interest rate is determined in the credit market and that the interest rate does not equilibrate the money market. In the empirical section of the paper the model is estimated for Switzerland and two simulation experiments are conducted.

Zusammenfassung

Ein Geld- und Kreditmarktmodell für die Bestimmung des Zinses und des Preisniveaus

In einem kürzlich in dieser Zeitschrift veröffentlichten Aufsatz (Heft 90/1) habe ich Schätzungen vorgelegt, aus denen hervorgeht, dass Änderungen des Zinses (d.h. Schwankungen der Geldnachfrage) bedeutende Änderungen des schweizerischen Preisniveaus nach sich ziehen. Im vorligenden Aufsatz werden die Veränderungen des Zinses mit dem Liquiditätseffekt des Geldes und mit Veränderungen nicht-monetärer Faktoren erklärt. Das Modell, das entwickelt wird, steht in der Tradition des sogenannten "buffer-stock"-Ansatzes zur Modellierung der Geldnachfrage. Neben Schätzungen des Geld- und Kreditmarktmodells enthält der vorliegende Aufsatz auch die Resultate der Simulation einer Geldmengenausdehnung und einer Kreditkontraktion.

Résumé

Un modèle de marché monétaire et de marché de crédits pour la détermination du taux d'intérêt et du niveau des prix

Dans un article publié récemment dans cette revue (No 90/1), j'ai présenté des évaluations selon lesquelles des variations du taux d'intérêt (c'est-à-dire des variations de la demande de monnaie) provoquent des modifications notables du niveau des prix suisses. La présente étude explique les variations de l'intérêt en fonction de l'effet de liquidité de l'argent ainsi qu'en fonction des variations de facteurs non monétaires. Le modèle développé se place dans la tradition du principe de "buffer-stock" pour la modélisation de la demande de monnaie. Outre les estimations des modèles de marchés monétaires et de marchés de crédits, la présente étude présente aussi les résultats de la simulation d'un accroissement du flux monétaire et d'une contraction des crédits.