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Monetary Conditions in the Euro Area: Useful Indicators of Aggregate Demand Conditions?

by

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Abstract:

This paper reviews the usefulness of monetary conditions in the euro area as leading indicators for aggregate demand conditions. Monetary conditions are measured with the MCI concept proposed by the Bank of Canada, and with the yield spread. A central result is that causality runs in both ways between monetary and aggregate demand conditions. The endogeneity of monetary conditions raises important implications for its role as a predictor of aggregate demand. It is shown that the information content of monetary conditions depends on the source of business cycle fluctuations and on the response of the central bank to those fluctuations.

Keywords: Monetary Conditions, MCI, Output Gap

Schlüsselworte: Monetäre Rahmenbedingungen, MCI, Output Gap

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1 Introduction

With the beginning of the third stage of the European Monetary Union, most business cycle reports published by banks, economic research institutes or international organizations have begun to cover euro area monetary developments in their analyses. Since the monetary policy course of the European Central Bank (ECB) has implications for national aggregate demand conditions, such analyses form an indispensable part of even those reports which are otherwise confined to a national scope. The monetary policy section of a business cycle report is typically comprised of an analysis of the monetary policy stance, which focuses on the movements of the policy instrument, and monetary conditions, including those variables such as exchange rates or long-term interest rates which are generally deemed to be part of the monetary sphere but are not directly controlled by the central bank. Assessment of the monetary policy stance serves to determine in which direction the central bank attempts to steer the economy. Analysis of the monetary conditions, on the other hand, goes beyond the direct effects of central bank actions and aims to summarize the effects of developments in the monetary sphere in general on aggregate demand conditions. Since monetary developments are often deemed to have a major influence on aggregate demand, or even to be an important source of business cycle fluctuations, the analysis of monetary conditions matters in particular for the business cycle forecast, where indicators of the monetary conditions serve as leading indicators of aggregate demand conditions.

Typically, monetary developments are summarized in a qualitative statement like ‘the monetary conditions stimulate economic activity’.[1] Rarely does a

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1 For example, the joint business cycle report published by the six leading German economic research institutes (Gemeinschaftsdiagnose) often chooses such a formulation to conclude its section on monetary developments.

business cycle report quantify this effect further. Since the monetary sphere is considered to be important, it is tempting for the reader to conclude that economic activity will accelerate once the transmission process from a monetary impulse to the real sphere has run its course in stimulating aggregate demand. This paper takes a closer look at the leading indicator qualities of monetary conditions. For this purpose the relationship of two widely used monetary conditions indicators to the output gap as a proxy for aggregate demand conditions in the euro area is considered. A simple plot of both variables in time suffices to show that this relationship is too complex to be adequately described by an unqualified leading indicator concept. Also, apparently aggregate demand conditions have had a noticeable effect on monetary conditions, pointing to a two-way causality. Hence, the view that monetary conditions are an exogenous force driving aggregate demand is likely to be misleading in many instances. In addition to empirical evidence there are also theoretical reasons suggesting that monetary conditions respond endogenously to aggregate demand conditions. This observation has important implications for the information content of monetary conditions as a predictor of the output gap. In particular, it is shown that the information content of monetary conditions depends on the source of business cycle fluctuations as well as on the response of the central bank to those fluctuations. This paper reviews a number of cases relevant in this respect, thereby demonstrating under which conditions monetary conditions remain a reliable leading indicator of aggregate demand conditions, but also revealing when this is not the case.

Monetary Conditions are often evaluated on the basis of short-term interest rates, the exchange rate and long-term interest rates. This paper first reviews in section 2 the monetary conditions index (MCI) concept proposed by the Bank of Canada. The MCI combines the short interest rate and the exchange rate into a

summary index; variants of this measure are now routinely used by business cycle analysts or international institutions like the IMF. This concept is applied in section 2.1 to euro area data, which is followed in sections 2.2 and 2.3 by an analysis of the relationship of this index to economy-wide aggregate demand conditions as measured by a conventional estimate of the output gap. Another popular indicator of the monetary conditions is the yield spread, which is discussed in section 3. The final section contains the conclusion.

2 The Monetary Conditions Index

The MCI, popularized by the Bank of Canada[2]; combines changes in the short interest rate and movements of the exchange rate into a summary index, aimed at capturing the developments in the monetary sphere.[3] Since practically every measure of the monetary conditions pays attention to the short rate as a proxy for policy actions, the distinguishing feature of the MCI is the inclusion of the exchange rate. The motivation for this is twofold.[4] First, in a small open economy with a flexible exchange rate regime the exchange rate channel plays an important role in the monetary transmission mechanism. Therefore exogenous shocks to the exchange rate can have a considerable impact on aggregate demand conditions. Second, by considering the interest rate and the exchange rate channel separately, monetary policy actions are decomposed into their interest rate and exchange rate effects. In general, monitoring both effects separately helps to avoid the error of

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2 For the justification of a monetary conditions index in the monetary policy framework of the Bank of Canada see Freedman (1994).

3 It is possible in principle to extend the MCI to include additional variables, such as the long-term interest rate, for example. For a discussion see Peeters (1999). To keep the exposition simple, this chapter focuses on the original concept with only the exchange rate as additional variable. This is the most widely used variant of the MCI.

4 This discussion is based on Freedman (1994), pp. 73.

ignoring the exchange rate channel, which is a potential hazard when attention is focused entirely on the interest rate movements.

To clarify the latter point, it is useful to consider an example of a tightening of policy. Typically, restrictive monetary actions following the decision to tighten monetary policy lead to both a rise in the short-term interest rates and an appreciation of the exchange rate. However, the particular split between interest and exchange rate changes is determined by the markets and generally depends on factors like the length of the time the market expects the higher interest rates to last and may vary from case to case. Thus, depending on market perceptions a tightening action of the central bank could result in a large increase of the interest rate and a small appreciation, or in a small increase of the interest rate and a large appreciation. While the overall effect on aggregate demand may be the same, the latter scenario would mainly affect the exchange rate sensitive tradable sector. This example suggests that ignoring the exchange rate effects could lead to two types of errors. First, if only the interest rate movements are taken into account and no attention is paid to the exchange rate effects induced by the policy action, the central bank could be tempted to tighten excessively since it makes no allowances for the dampening effect of the appreciation on output.[5] As a result, aggregate demand is reduced by more than intended. Second, monetary policy puts in the scenario with the large appreciation considerable stress on the tradable sector, which has to carry the main burden of adjustment. In this context the monetary conditions index is intended to make sure that exchange rate effects are kept in mind, as these are potentially important for the sectoral impact of policy actions.

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[5] However, in general it is possible to estimate the overall output effects of a given policy action without having to model the different channels of transmission. In principle, the transmission mechanism can be treated like a black box for this purpose. So this case really

More formally, the Bank of Canada defines their MCI as the weighted average of changes in a short-term interest rate and an exchange rate relative to a base value:

$$[1] \qquad MCI_t = \Phi_R\left(R_t - R_0\right) + \Phi\left(e_t - e_0\right).$$

with R_t denoting the level of the interest rate and e_t the logarithm of the exchange rate. The time index 0 gives the base period. The weights used for the calculation of the MCI reflect the estimated relative effects of an interest rate and an exchange rate impulse on aggregate demand over some period, usually two years. They can be derived from econometric evidence regarding the determinants of aggregate demand. Typically, an equation of the form

$$[2] \qquad \Delta y_t = a\Delta R_t + b\Delta e_t + \text{other variables} + \text{error}$$

is estimated, where y_t denotes aggregate demand and Δ is the first difference operator.[6] With an appropriate dynamic specification of [2], the effects of a change in the two variables R_t and e_t on aggregate demand can be computed for any time horizon of interest. The parameter *a* gives the effect on aggregate demand of a one percentage point increase of the interest rate, controlling for the effects of the interest rate impulse on the exchange rate. The parameter *b* represents the corresponding effect of a one percent appreciation of the domestic currency. The relative MCI weight μ is $\hat{a}/\hat{b}$, where $\hat{a}$ and $\hat{b}$ are the estimated coefficients from [2]. For example, a value of *3* for μ, which is the relative

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represents a misjudgment of the central bank about the overall aggregate demand effect of its policy action.

6 See for instance Ericsson et al. (1998), p. 248. They use this type of equation to assess the uncertainty of MCI weights and find that these are model dependent and are often estimated quite imprecisely. For a discussion of the implications of estimation uncertainty see Ericsson et al. (1998), pp. 246.

weight the Bank of Canada uses, implies that a one percentage point increase of the interest rate has three times the effects on aggregate demand than a one percent appreciation of the exchange rate. The MCI weights Φ_R and Φ_e are derived from μ, as $\Phi_R/\Phi_e = \mu$ must hold. That is, the parameters Φ_R and Φ_e are obtained by rescaling the estimated parameters $\hat{a}$ and $\hat{b}$. In this respect it has become common to scale the weights so that they sum to unity, because with this normalization one can interpret the MCI in units equivalent to the interest rate, measured in fractions.[7] Accordingly, if the MCI increases by one unit, this corresponds to a tightening of monetary conditions equivalent to a one percentage point increase of the interest rate. In this context it needs to be emphasized that the level of the MCI depends on the base value, the chosen weights and the measures of the interest rate and the exchange rate. Since a number of choices for these parameters and time series are feasible, it follows that the level of the MCI has no real meaning. This is an important caveat, because it implies that the MCI index cannot be employed to determine whether the present *level* of monetary conditions is stimulating or dampening economic activity. Instead, it is the *change* of the MCI index which is relevant for the interpretation of monetary conditions, since it indicates an easing or tightening of the monetary conditions. In particular, subtracting the MCI at two points of time gives a measure of the change in monetary conditions between those two points of time. Hence, the MCI allows judgment whether monetary conditions have become more expansionary or more restrictive.

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7 Note that only the relative weights have any economic meaning, so the absolute scale can be chosen freely. See Ericsson et al. (1998), p. 241.

2.1 Constructing a MCI for the Euro Area

The upper panel of Figure 1 plots an MCI index for the euro area. The MCI has been computed using a 3 month interest rate and the US dollar / euro exchange rate.[8] The first quarter of 1980, which is the beginning of the sample period, has been chosen as the base period. The weights are taken from Peeters (1999).[9] She obtains these through estimating the parameter *a* for the interest rate variable by simulating an interest rate shock in a large macroeconometric model for the European Monetary Union (EMU) while keeping the exchange rate channel closed; this experiment is repeated for the exchange rate shock with the interest rate channel closed, which yields *b*.[10] Based on the two-year response of real GDP Peeters finds for the relative MCI weight m that a one percentage point increase of the interest rate has the same effect on aggregate demand as a 2.6 % appreciation of the Euro relative to the US dollar.[11] Following common practice, the MCI weights Φ_R and Φ_e scaled so that they sum to unity. Accordingly, an increase in the MCI index by one unit is equivalent to the effect of a one percentage point increase of the interest rate. An upward movement of the MCI indicates a tightening of the monetary conditions.

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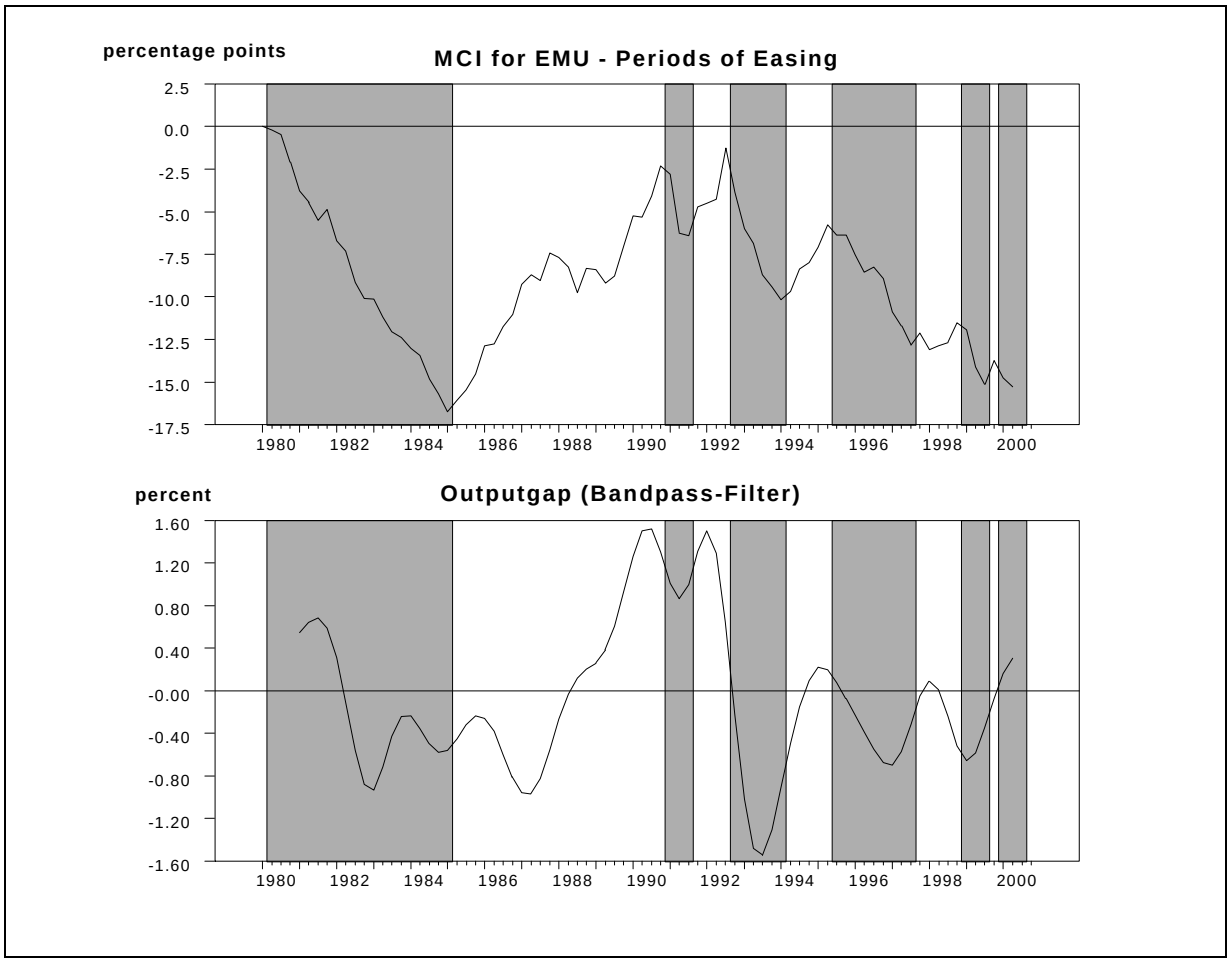
8 Following Peeters (1999), the MCI is expressed in nominal terms. Sometimes real measures are used for the interest rate and the exchange rate; for a discussion see Peeters pp.187. The short-term (3 month) interest rate for the Euro area is available from Datastream beginning in 1998. A backward estimate has been computed using data provided by Coenen and Vega (1999). A long time series for the nominal US dollar / euro exchange rate has been kindly provided by Jörg Clostermann. For a description of this „synthetic„ euro exchange rate see Clostermann and Schnatz (2000). Beginning in 1999 the actual exchange rate (Datastream) has been used. Note that an increase (decrease) indicates an appreciation (depreciation) of the euro. The sample period covers the period from the first quarter 1980 until the second quarter of 2000.

9 Peeters (1999), p. 199, table 3, NiGEM specification with long-term rates endogenous.

10 Each shocked variable is returned to its baseline after five years.

11 For comparison, Peeters reports for Germany the relative weight as 4.3:1 .

Figure 1: An MCI for the Euro Zone and the Business Cycle



2.2 The MCI as a Leading Indicator of Aggregate Demand Conditions

To illustrate the relationship between the MCI and the business cycle[12], a measure of the output gap for the euro area has been plotted in the lower panel.[13] To help visual inspection, periods of an easing of the monetary conditions have

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12 Business cycle fluctuations are defined in the remainder of this paper as fluctuations of aggregate demand.

13 Eurostat provides a real GDP series for the euro area beginning in 1991 (Datastream). A backward estimate has been obtained using data provided by Coenen and Vega (1999). The output gap has been computed with the help of a band-pass filter. As recommended by Baxter and King (1995), the „Burns and Mitchell„ specification has been used, which considers frequency components between six and 32 quarters as constituting the business cycle. The output gap is defined as the difference of actual and potential output.

been shaded in both panels. It becomes apparent that the link between monetary conditions and aggregate demand, measured here as the output gap, is rather variable, which casts some doubt on the proposition that monetary conditions are a reliable leading indicator of aggregate demand. This holds in particular for the eighties. The first half of the eighties witnessed a substantial easing of monetary conditions – equivalent to a 17 percentage point reduction of the short interest rate – without activity visibly picking up.[14] In the second half of the eighties monetary conditions tightened again, accompanied by a strong boom in the last years of the decade. For the nineties, there is more evidence for the MCI leading the business cycle, as an easing of monetary conditions is always followed by an increase in the output gap, indicating a recovery of economic activity. Nevertheless, the lead time of this indicator is quite variable. For instance, measuring it as the time between the upper turning point of the monetary conditions index and the lower turning point of the output gap, the lead time has varied between two and eight quarters. Also, an easing of the monetary conditions equivalent to a one percentage point reduction of the interest rate has led to a pick up in activity anywhere between 0.1 percent and 0.3 percent of GDP during the nineties.

Moreover, a more formal investigation of the lead/lag relationship in the nineties between the MCI and the output gap using a cross correlogram reveals the presence of another important relationship between these two variables. Figure 2 plots for this purpose the cross correlation of the output gap series and the MCI, where the MCI is leading the former series up to 16 quarters. The dotted lines represent the two standard error bounds, corresponding to a two sided test on significance at the five percent level. If an easing (or tightening) of

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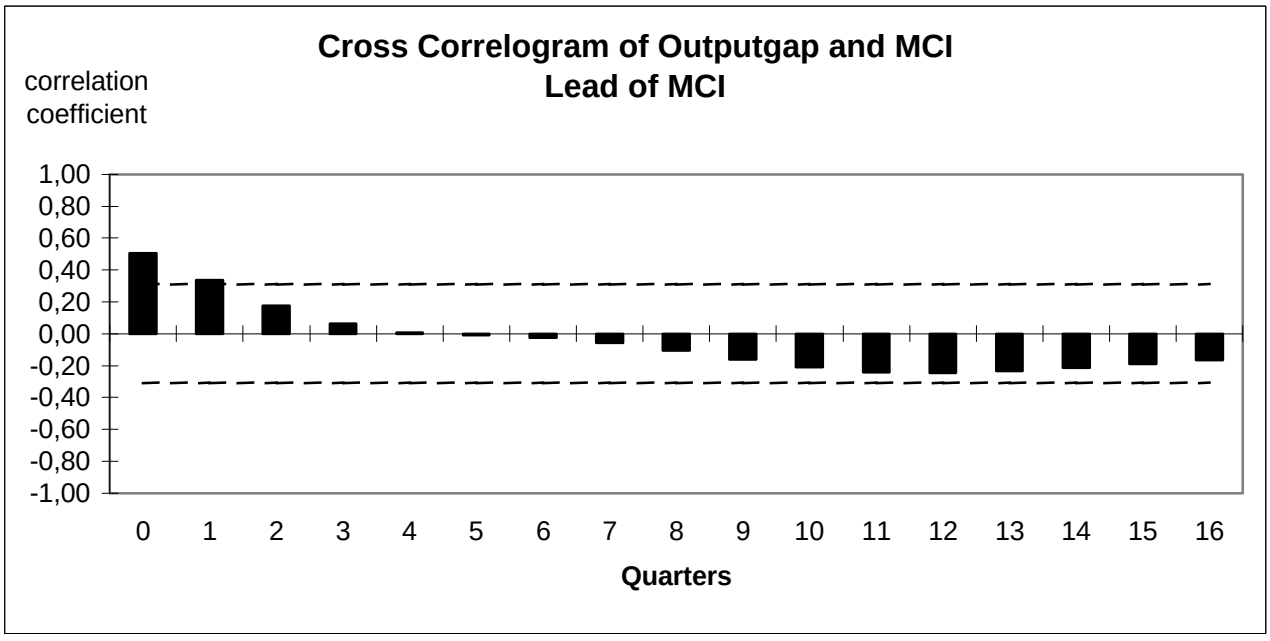
14 This massive easing was almost entirely due to an approximately 50 percent depreciation of the euro relative to the US dollar in this period.

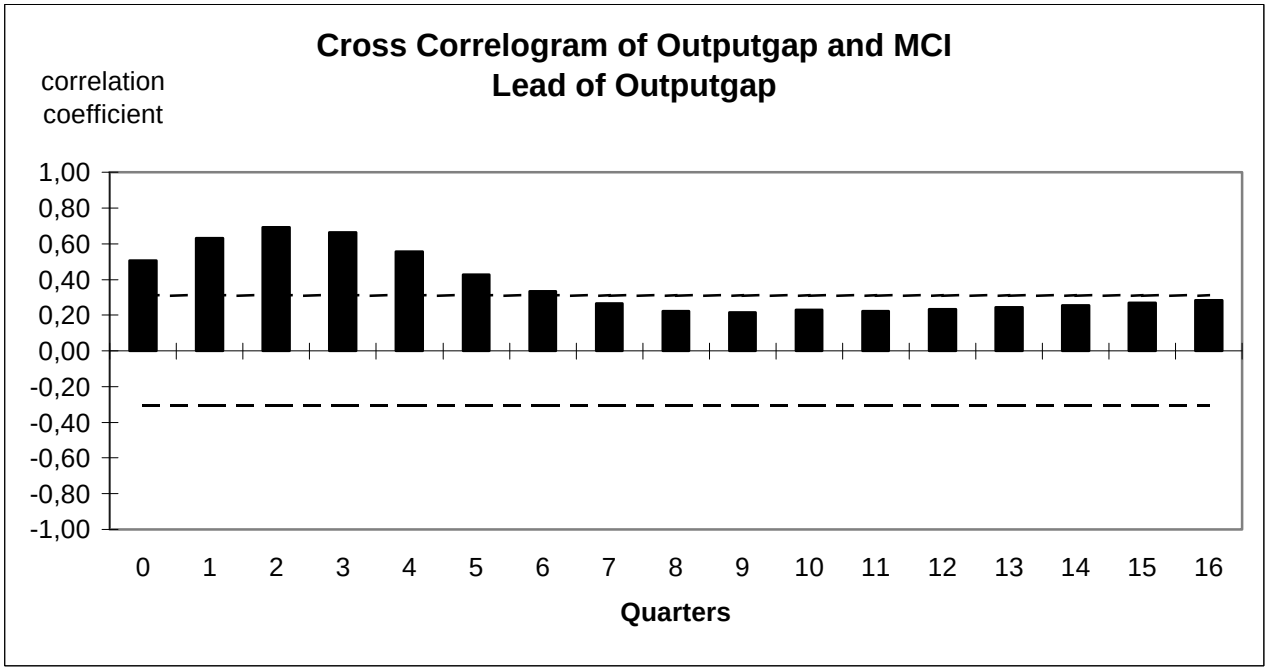
monetary conditions leads output, one would expect to find a significant negative correlation between the two time series, as the MCI shifts downwards (upwards) while output moves upwards (downwards). The negative correlation reaches a local maximum (in absolute terms) at the 12 quarter horizon, suggesting a three year lead of the MCI. However, this relationship is insignificant at the five percent significance level. Instead, there appears to be a strong contemporaneous correlation. Figure 3, which plots the corresponding cross correlogram for a lead of the output gap, confirms this finding. In fact, it is the output gap which leads the MCI by about two quarters. The positive correlation coefficients suggests that an upswing of output is followed by a tightening of monetary conditions. The results in figure 2 and 3 show that this relationship is considerably stronger than the leading behavior of the MCI.

Figure 2: Cross Correlogram of Output gap and MCI - MCI Leads the Output gap



Notes: The dotted lines are the approximate two standard error bounds computed as $+-2/\sqrt{T}$. The sample period is 1990:1 till 2000:2

Figure 3: Cross Correlogram of Output gap and MCI – Output gap Leads the MCI



Notes: The dotted lines are the approximate two standard error bounds computed as $+-2/\sqrt{T}$.
The sample period is 1990:1 till 2000:2

Is the finding that the output gap leads monetary conditions particular surprising? In fact, it is not. On the contrary, since monetary policy responds in a systematic way to business cycle conditions in order to meet both its output and price stability goals, such a relationship was to be expected.[15] This is confirmed by empirical evidence on central bank reaction functions, which often show that policy makers conduct policy in a countercyclical way and thereby cut the short rate when the economy faces a downturn, and vice versa.[16] Also, since the US dollar / euro exchange rate is not an exogenous variable, but is determined in exchange rate markets, it is likely to be influenced both by monetary policy in the euro area and the United States as well as by relative aggregate demand

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15 See, for instance, Clarida et al. (1999) for a detailed discussion of the optimal response of monetary policy to an aggregate demand disturbance.

16 For international evidence on reaction functions see Clarida et al. (1998).

conditions in both continents.[17] Taken together, this implies that the MCI is not an exogenous factor determining aggregate demand conditions, but to a considerable extent the MCI is itself determined by those conditions. That is, the MCI is largely endogenous with respect to the business cycle.

2.3 Interpreting the MCI

The preceding section has shown that the relationship of the MCI with the output gap is not a straightforward one. In particular, one should expect interactions between aggregate demand and monetary conditions. This suggests that the movements of the MCI need to be carefully interpreted. This section discusses some of the factors that are relevant in this regard. Since the factors which determine the relationship of the short-term interest rate and the output gap differ somewhat from those relevant for the relationship of the exchange rate and the output gap, the two components of the MCI are discussed separately. First the role of the short-term interest rate is reviewed, then the exchange rate is considered.

Regarding the short-term interest rate as a monetary policy instrument, its role as a leading indicator of aggregate demand conditions depends crucially on the importance one assigns to monetary policy as a factor for business cycle fluctuations. There are two dimensions to this issue. First, the question arises to what extent discretionary policy actions are a source of business cycle fluctuations. These disturbances play a predominant role in the Monetarist framework, for instance, where the central bank aims to keep the unemployment rate below the natural rate, requiring constant discretionary actions to surprise the agents in the model. Second, one has to take a stand on the question whether systematic

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[17] See Clarida and Gali (1994) for a theoretical exchange rate model incorporating these

monetary policy has real effects. If so, one has to decide whether systematic monetary policy tends to stabilize the economy in the sense that it dampens the amplitude of business cycle fluctuations or whether it does the opposite and amplifies fluctuations, presumably because of lags in the decision making process and the transmission of monetary impulses to the real sphere. To illustrate the relevance of these considerations for the relationship of the interest rate and the output gap, three different cases will be reviewed. The first assumes that business cycle fluctuations are entirely due to non-monetary forces. Moreover, it is assumed that systematic monetary policy has no real effects. In contrast, the second case assumes that business cycle fluctuations are due to monetary policy actions only. This example is supposed to capture some of the intuition behind Monetarist and New Classical thinking about business cycles. The third case focuses on the role of systematic policy. For this purpose it abstracts from monetary policy disturbances, but allows for real effects of systematic monetary policy.

In the first case it is assumed that business cycle fluctuations are dominated by other factors than monetary policy. This view is, for instance, compatible with the Real Business Cycle (RBC) perspective of business cycle fluctuations, which stresses the role of supply side shocks in accounting for output fluctuations at the business cycle frequency. Monetary policy has no real effects in this framework, because RBC models do not allow for nominal rigidities. Hence, the output gap does not reflect aggregate demand conditions either, but is determined by adjustment processes of the economy to real disturbances. In this world monetary policy still matters for the determination of the price level. To the extent that the output gap enters the reaction function of the central bank, there would still be a systematic relationship of the policy instrument to the output gap. But because of

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factors and Döpke et al. (2001) for an empirical application.

the ineffectiveness of monetary policy with regard to real variables, there is no reason to employ such a relationship for the purpose of predicting the output gap. This requires instead the timely identification of supply disturbances buffeting the economy and to infer the optimal dynamic response of economic agents to these disturbances. A measure like the MCI is quite irrelevant for this purpose.

In the second scenario, monetary policy is assumed to be the dominant source of business cycle fluctuations and all other shocks are negligible. In this case, the direction of causality goes unambiguously from monetary policy actions to the output gap. This is the other polar case, where the short-term interest as a proxy for the policy instrument is indeed a useful leading indicator of the output gap. However, if the lags in the monetary transmission process are variable, as it is often assumed in the Monetarist and New Classical literature, this would imply a variable lead time of the interest rate as well, reducing its usefulness as a leading indicator. As regards this point, it is noteworthy that the assumption of variable lags in the transmission of monetary impulses would help to reconcile the findings from figure 1 with the Monetarist perspective, since this would account for the rather variable relationship of the monetary conditions to the output gap. From this follows that even from this standpoint of view the MCI should not be used in a ‘mechanical’ way as a leading indicator.

In the third case, non-monetary policy shocks lead to fluctuations of aggregate demand, but in contrast to the first case, the systematic response of monetary policy is assumed to have real effects. To demonstrate the implications of this scenario, an adverse real demand shock is considered. Such real (as opposed to nominal) demand shocks could include impulses from fiscal policy, changes in foreign demand or shifts in expectations in the private sector due to the famous ‘animal spirits’, all of which play in many models an important role in determining aggregate demand. In response to such an adverse shock, monetary

policy is likely to ease. If monetary policy implements a successful stabilization policy, it will manage to shave off the peaks and fill in the troughs of the business cycle. Consequently, the economic slow down due to the adverse demand shock will be followed by a modest recovery, as the monetary easing helps to bring output back to potential. In contrast, if monetary policy eases too late or too aggressively, the economic slow down will be followed by a boom, as the monetary stimulus pushes output above potential.[18] This example illustrates that the view one holds on the reaction function of the central bank is central for the relationship of the policy instrument and the output gap.

Regarding the role of the exchange rate, it has been emphasized above that flexible exchange rates respond endogenously to business cycle conditions. Therefore the source of shocks driving the business cycle and hence the exchange rate has important implications for the interpretation of this index. In particular it matters whether aggregate demand or supply shocks buffet the economy.[19]

First, a real aggregate demand shock is considered. A recent example is the strong demand expansion in the United States during the second half of the 1990s, which has been interpreted as a foreign demand shock for the euro zone. In response to booming demand the Federal Reserve Bank raised interest rates considerably, which has led to a widening differential between American and euro zone interest rates. This has presumably contributed substantially to the appreciation of the dollar and hence to the depreciation of the euro. Abstracting from the euro interest rate, the euro area MCI would indicate an easing of the monetary conditions. The MCI is a reliable leading indicator of aggregate demand

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18 Eventually this boom will be followed by another recession. Hence, in this case monetary policy did not stabilize output, but contributed to the propagation of business cycle fluctuations.

19 For a discussion of the contribution of supply, real demand and monetary shocks to the recent movements of the $/euro exchange rate see Döpke et al. (2001).

conditions in this case, because aggregate demand in the euro area is boosted both by the boom in the United States and the depreciation of the euro, since European exports benefit from increased price competitiveness. However, the MCI for the USA would indicate a tightening of monetary conditions, even though aggregate demand is strong. In fact, the strength of American aggregate demand is in this example precisely the reason why monetary conditions in the US are becoming tighter in the first place. Hence, with a domestic real demand shock the relationship between the MCI and aggregate demand is reversed.

The effects of a nominal demand shock – for instance, a discretionary cut of the euro interest rate – have already been discussed in the context of the relationship of the policy instrument and the output gap. Because such an interest rate reduction would induce a depreciation of the euro, the MCI indicates unambiguously an easing of monetary conditions. Since the reduction of the interest rate and the depreciation both stimulate aggregate demand, the MCI is in this case a reliable leading indicator of aggregate demand conditions.

To investigate the implications of an aggregate supply shock for the relationship of the exchange rate and the output gap, the effects of an adverse terms of trade shock like a (lasting) rise in oil prices are reviewed. Noting that the euro area is a large net importer of oil, the equilibrium real exchange rate will tend to depreciate due to the effect of the higher oil price bill on the current account balance. The MCI will signal an easing of the monetary conditions, but as an indicator for demand conditions this is misleading, because via its effects on real income the deterioration in the terms of trade actually depresses domestic demand. Regarding external demand, exports may benefit from the depreciation, but by increasing input costs the higher oil price will leave its mark here as well, so that all in all the effect on aggregate demand is presumably negative. More generally, when the equilibrium real exchange rate changes, the MCI is likely to

be a poor indicator. This is probably one important factor for the poor performance of the MCI in the eighties, where swings in the terms of trades and diverging supply conditions in the USA and Europe presumably account for some part of the exchange rate movements in this period.

In conclusion, to the extent that an MCI index is to be employed as a leading indicator of the business cycle stance, this is complicated by the endogeneity of the MCI, implying that the causality between monetary policy variables and real activity runs in both directions. In addition, the interpretation of the MCI depends on the specific shocks hitting the economy. This makes it difficult to interpret a general statement like 'the monetary conditions are expansionary', which is often found in business cycle reports. This statement suggests that there is a positive impulse on aggregate demand conditions coming from the monetary sphere. As has been noted in the introduction, it is tempting to conclude that the economy will soon enter into a phase of strong aggregate demand. If aggregate demand conditions are satisfactory to begin with and monetary policy has embarked on an expansionary course, one can indeed expect an acceleration of economic activity. Hence, in this scenario of a discretionary monetary policy disturbance the MCI is unambiguously a leading indicator of aggregate demand conditions, even though the lead time may be quite variable, if the lags in the monetary transmission process are variable. However, in the case of an aggregate non-monetary demand shock or an aggregate supply shock the relationship of the MCI and the output gap is less straightforward. Returning to the example of a positive foreign demand shock like a boom in the United States, the euro is likely to depreciate, at least initially, while countercyclical monetary policy in Europe implies that euro area short-term interest rates rise. Hence, the exchange rate and the interest rate initially move into opposite directions. If systematic monetary policy has real effects and European monetary policy makers conduct a successful stabilization

policy, tighter monetary policy (including the effect of a higher interest rate on the exchange rate) will dampen the effect of strong foreign demand on European aggregate demand conditions, moving output gradually back to its potential level in order to prevent an overheating of the European economy. Whether this policy induces the MCI to move upwards or downwards depends on the relative strength of the interest rate and exchange rate responses to these developments. If the European interest rate response is sufficiently strong, the MCI will signal a tightening of monetary conditions. But in this case monetary conditions are tight precisely because aggregate demand is strong. Accordingly, a 'mechanical' interpretation of the MCI would be rather misleading. A similar result emerges for a domestic real demand shock, like an expansionary impulse from fiscal policy, for example, which has a positive effect on aggregate demand. In response to this stimulus, monetary conditions are likely to become tighter; hence, aggregate demand and monetary conditions move again into opposite directions. The relationship of the MCI and the output gap in the presence of an aggregate supply shock is not straightforward either. An oil price shock, for instance, reduces aggregate demand via its effect on real income and leads moreover to inflationary pressures. In addition, it has an effect on the current account balance, which may lead to a depreciation of the currency. Monetary policy makers are likely to respond by raising interest rates to counter rising inflation. The net effect on the MCI is ambiguous. Consequently, the relationship of the MCI and aggregate demand is ambiguous too. This illustrates that the practical use of a measure like the MCI as a forecasting tool is limited, unless it is complemented by a careful analysis of the general business cycle situation.

3 The Yield Spread as Predictor of the Business Cycle Stance

The yield spread is another popular measure of the monetary conditions, which is often used to predict either future inflation or future economic activity.[20] Berk (1998, pp. 306) shows that the yield spread between the long- and short-term interest rate can be decomposed in the following way:

$$[3] \quad R(n,t) - R(1,t) = E_t\left[r(n,t) - r(1,t)\right] + E_t\left[\pi(n,t) - \pi(1,t)\right] + \varphi(n,t) - \varphi(1,t),$$

where *R(n,t)* denotes the yield to maturity at *t* of a bond with n-periods to maturity, *E* is the expectations operator, *r(n,t)* gives the average real interest rate over the next n periods, $\pi(n,t)$ is the inflation rate over this period and $\varphi(n,t)$ is the risk premium on a bond with *n*-periods until it matures. This decomposition suggests that the yield spread is a perfect indicator of future inflation if and only if the expected real rates and the risk premia are constant over time and expectations are formed rationally. The first two assumptions ensure that the first and third term on the right hand side of [3] can be neglected, while the third assumption implies that the forecast errors of inflation are unpredictable. However, if the yield spread is supposed to predict the output gap in a reliable way, one needs a different set of assumptions. In particular, while in the previous case prices are flexible over the n-period time span considered in [3], one has to assume for the purpose of predicting output that prices are fixed over this period; the risk premia are again supposed to be constant over time. With these two assumptions the nominal yield spread reflects the real rate spread, which in turn contains information about expected future real activity. It becomes apparent here that in the intermediate case where prices are neither fixed nor adjust

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[20] This section draws very much from Berk (1998), who provides a survey on the information content of the yield curve and its implications for monetary policy. For an empirical investigation using German data see Sauer and Scheide (1995).

instantaneously to a nominal disturbance, the yield spread gives a noisy forecast of business cycle movements, unless one takes inflation expectations into account. But before turning to this case, the discussion returns to the scenario with fixed prices, as this simplifies the exposition.

With prices fixed, the information content of the yield curve regarding future economic activity depends on the type of shock hitting the economy. Since this leads to similar issues as have been discussed for the MCI, the discussion can be kept brief here. Beginning with monetary policy as a source of business cycle fluctuations, an expected tightening of policy, for example, implies that the expected future short-term interest rates rises, which according to the expectations theory of the term structure raises current long-term real rates. Accordingly the yield curve becomes steeper. The tightening of policy will eventually lead to a weakening of economic activity; hence, a steepening of the yield curve indicates a downturn of the business cycle.

Next, as an example for a real demand shock an adverse real demand shock is considered, which is expected to lower output for some time. This will lead to lower short rates in the future, as the demand for money for transaction purposes is reduced; in the IS/LM diagram this shock shifts the IS curve to the left. As the lower future short rates translate into lower current long rates, the yield spread becomes narrower. In contrast to the monetary shock, here a period of weak economic activity is indicated by a flattening of the yield curve.

Finally, regarding the effects of a supply side shock, a lasting deterioration of supply conditions serves as an example. In this scenario the short-run marginal productivity of capital declines; thus, future short rates will be lower, the current long rate will decline, and the yield curve will become flatter. Just as in the case of the real demand shock, a flattening of the yield curve indicates a weakening of economic activity, but in contrast to the demand shock this reflects a lower

potential GDP, not a downturn in the business cycle. To summarize, just as in the case of the MCI the interpretation of movements in the yield curve cannot proceed without analyzing the sources of business cycle fluctuations.[21]

As has been pointed out above, interpreting the yield curve becomes even more complicated when prices are flexible. This can be illustrated with the help of an example where monetary policy embarks on a restrictive course; with flexible prices this policy course eventually leads to a lower inflation rate. This implies a lower nominal short rate in the future even though real short rates rise temporarily. Accordingly, the current nominal long rate declines and the yield curve becomes flatter, which indicates a weakening of activity due to the tighter monetary policy course. So the result is reversed compared to the case with fixed prices, where the yield curve has become steeper in response to a tightening of policy.

Turning to the empirical evidence for the leading indicator qualities of the yield curve, figure 4 shows the interest spread between the long and short rate

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21 Another view of the yield spread argues that a narrowing of the spread has itself a significant dampening effect on economic activity, as this leads to a diversion of savings from 'productive' long-term real investments to 'unproductive' short-term financial investments, since the latter become more attractive due to the rise of the short rate relative to the long rate (DIW (1999), p. 38). This approach implies that the spread takes a central role in the monetary transmission mechanism and that short rates should be set relative to long rates. However, this view is somewhat at odds with the predictions from a standard model like the IS/LM framework. This is apparent in the case where the long-term interest rate declines while the short rate remains constant. According to standard macroeconomics a decline of the long rate has the primary effect that it lowers the opportunity costs of investment projects and therefore stimulates economic activity. With a constant short rate as a secondary effect the share of financial investment may rise, but it is hard to see how this would dominate the primary effect and thus lead to a decrease of real investment, as suggested by the aforementioned approach. Also, the notion that an increase in financial investment drains the economy of resources is probably hard to reconcile with more elaborate portfolio models, since this would attribute something like a 'black hole' character to this type of investment vehicle, which is an unusual property in standard economics.

together with the output gap.[22] To help with the graphical inspection, the periods where the yield curve has become steeper have been shaded in both panels. It is hard to identify a clear relationship between the yield spread and the business cycle stance. This is not surprising since the discussion above has shown that many factors with different implications for the future course of economic activity can be behind the movements of the interest rate spread. Still, focusing on the nineties, it appears that a steepening of the yield curve is contemporaneously associated with weak economic activity and that it has some lead before a recovery sets in, but this relationship is not particular stable. This interpretation is in line with real demand shocks being important for the yield curve and the business cycle, but given the fragility of the relationship one should beware to draw strong conclusions here. Moreover, according to the corresponding correlogram, the contemporaneous correlation of the spread and the output gap is not significant and there is no evidence for a lead of the spread either. On the contrary, the output gap appears to lead the spread.[23] Additional evidence on the information content of the spread for the euro area is provided by Berk and Van Bergeijk (2000), who confirm that the practical usefulness of this variable for predicting future movements of output is limited.

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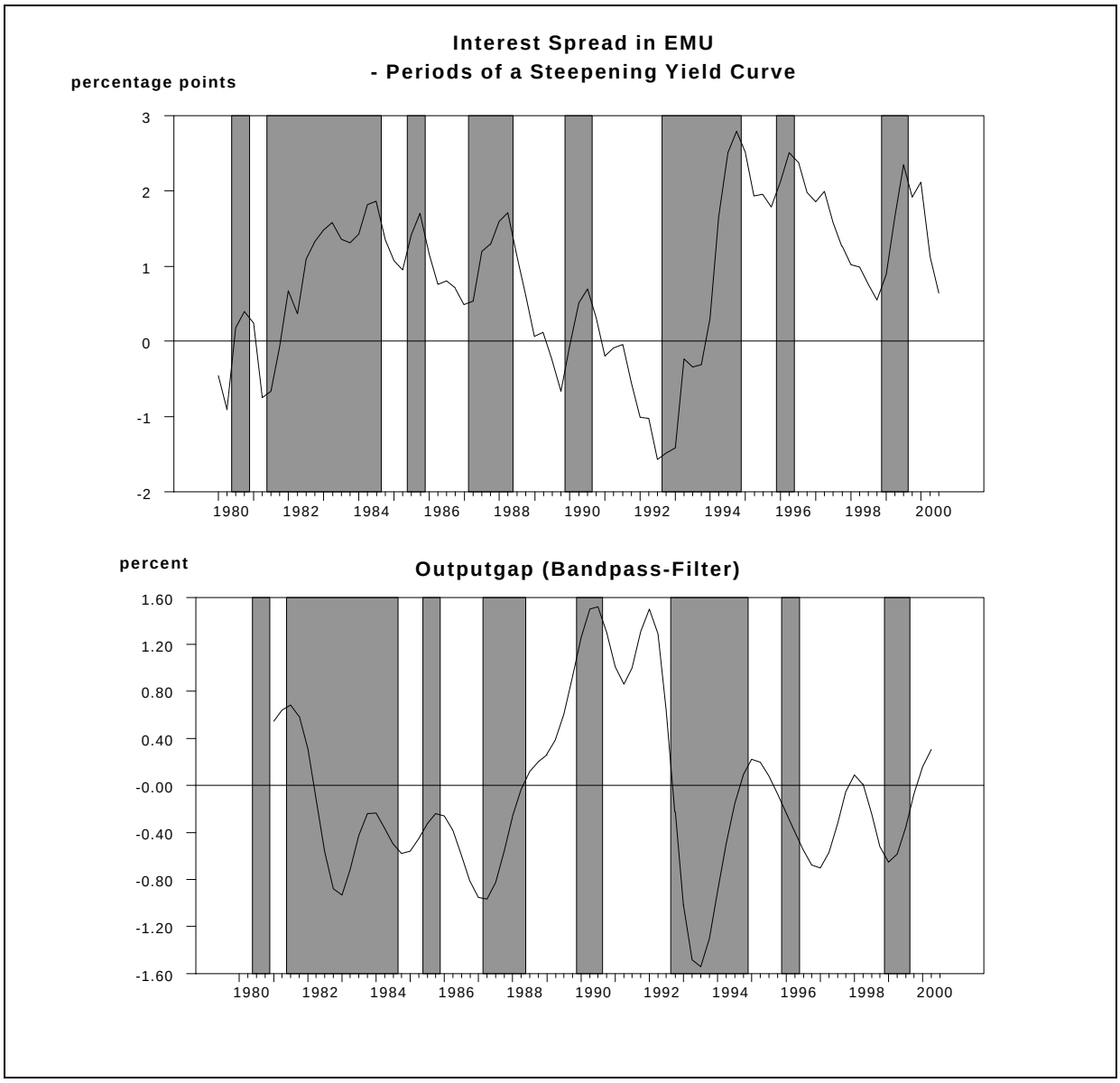
22 The short rate is the same as before. The long-term interest rate for the Euro area is available from Datastream beginning in 1994. A backward estimate has been computed using data provided by Coenen and Vega (1999). The long rate gives the yield on government bonds with a ten year maturity.

23 To preserve space, the correlograms are not shown here, but they are available from the author upon request.

Figure 4: The Yield Curve in the Euro Zone and the Business Cycle



4 Conclusion

The conclusion of this paper have been amply foreshadowed: If the monetary conditions are to be employed as a leading indicator of aggregate demand, this needs to be complemented by a careful analysis of the general business cycle situation. In particular, it is not advisable to interpret them in a ‘mechanical’ fashion, because the information content of the monetary conditions depends on

the sources of business cycle fluctuations. If output fluctuations are predominantly due to monetary disturbances, then monetary conditions can be employed in a straightforward way as a leading indicator of the output gap, since the causality runs in this case unambiguously from the monetary to the real sphere. However, if aggregate demand or supply shocks dominate, the causality runs in both ways, which changes the interpretation of the monetary conditions considerably. In case of domestic aggregate demand shocks – like fiscal policy impulses or shifts in private sector expectations – monetary conditions tend to offset these disturbances, thereby having a stabilizing influence on the economy. This implies that an easing of monetary conditions, for example, is likely to occur while economic activity decelerates. An important factor for the strength of the endogenous response of the monetary conditions to the change in aggregate demand is the reaction function of the central bank, which plays therefore an important role in the interpretation of monetary conditions. Regarding foreign demand shocks, matters become even more complicated, since the response of the foreign central bank matters too for the path of the exchange rate and for the long-term interest rate. While domestic aggregate demand conditions are likely to improve in response to a positive foreign demand shock, monetary conditions can become easier or tighter, depending on circumstances. Regarding aggregate supply shocks, the effects of these shocks on aggregate demand as well as on monetary conditions are ambiguous. Without a careful analysis of the specific situation, no statement about the relationship of monetary conditions to the output gap is possible in this case.

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