Selected Aspects of Monetary Integration

Iikka Korhonen[1])

1 Introduction

In this paper I estimate monetary conditions indices (MCIs) for three fairly large EU accession countries: the Czech Republic, Poland and Slovakia. The purpose is to assess the relative importance of interest rates and of the exchange rate in the transmission mechanism of monetary policy. This question is particularly pertinent for countries wishing to join the euro area relatively soon. If the exchange rate is an important determinant of monetary conditions, joining Economic and Monetary Union may entail major adjustments in the economy. It is possible that the structural changes brought about by joining Monetary Union change the way monetary transmission works. The economy would adjust over time to the new situation in which the exchange rate cannot be used as a monetary policy instrument. Monetary policy would no longer need to react to sudden exchange rate movements, which may increase stability (if the common interest rate policy is otherwise suitable for the country in question).

The MCIs derived for the accession countries can be used at least in two ways. They can be compared with those of the euro area countries before they joined Monetary Union. If the relative importance of interest rates and exchange rates is similar in the present accession countries to what it was in the present euro area countries before their entry into Monetary Union, the required changes in the economy may not be very big. Also, since the accession countries will not be able to join Monetary Union immediately, it is of interest to assess the relative importance of interest rates and of the exchange rate in the monetary transmission mechanism.

It is found that the MCIs determined for the three accession countries are roughly comparable to those calculated for the present euro area countries. MCI ratios for the Czech Republic and Slovakia indicate that their economies are perhaps not as open (and hence not as dependent on exchange rates) as could have been expected. For Poland, the calculated MCI ratio implies a large degree of openness and a greater importance of the exchange rate in the transmission of monetary policy. Obviously, these results may depend on the exchange rate regimes implemented in the respective countries.

The paper is structured as follows: In the second section I briefly review the concept behind the monetary conditions index. Next I examine the available data and calculate the MCIs for the three countries under review. Then I briefly compare the obtained results with previous research on MCIs in the euro area countries. The fifth section provides some concluding remarks.

2 Monetary Conditions Indices

Monetary policy affects the level of economic activity through a variety of channels. Usually four channels are identified: transmission through interest rates, effects stemming from changes in exchange rates, effects on other financial assets, and the so-called credit channel (Mishkin, 1995). Higher interest rates lead to a decline in capital accumulation (both of enterprises and households), which in turn translates into lower total output. It is generally assumed that higher interest rates ceteris paribus appreciate the domestic exchange rate. An appreciated exchange rate hurts the competitiveness of domestically

1 *BOFIT, Bank of Finland Institute for Economies in Transition.*

produced goods and as a consequence, net exports decline. Again, this leads to lower total output. Interest rate changes can affect the prices of many financial assets, which, in turn, may have an impact on investment spending, for example. Changes in asset prices can also alter households' wealth, which then affects their spending decisions. The credit channel of monetary policy becomes effective through banks. First, if monetary policy is contractive, banks' reserves fall and they will reduce their lending activities. Second, higher interest rates tend to lower the net value of companies. Therefore enterprises can pledge less as collateral to lenders (banks or other institutions), which will result in reduced borrowing, especially if moral hazard is a problem. As companies' borrowing decreases, so does their investment activity.

The effects of monetary policy decisions on economic activity and inflation are of obvious interest to central banks. If a central bank can exert at least some influence on both (short-term) interest rates and the exchange rate, the question of their relative effects on the economy becomes pertinent. It would be interesting to know, for example, by how much the exchange rate would appreciate if interest rates were 1 percentage point higher, for example. The effect of the exchange rate is obviously more important the smaller and more open an economy is. The monetary authority must also decide how to react to changes in the exchange rate if the interest rate is its main instrument.[1]) One way to measure the stance of monetary policy is the so-called monetary conditions index (MCI). Usually the MCI measures how changes in interest rates and in the exchange rate (even if the monetary authority does not control or manage the exchange rate) affect output and/or inflation. Following Mayes and Virén (1998), we can define the MCI as

$$MCI_t = \sum_s w_s(P_{st} - P_{s0}).$$

Here, P_s are variables related to the respective monetary policy instrument (usually only the interest rate and the exchange rate) affecting economic activity. Therefore, output can be written as a function of P_s (and other relevant variables X), $Y = f(P_{1t,}..., P_{st}, X)$. Weights w_s of the MCI will be computed from partial derivatives of f with respect to the instrument in question, taking into account the dynamic structure of the model.

The level of the MCI itself is of course quite unimportant, as it is completely arbitrary. More important are the relative effects of the exchange rate and interest rates on economic activity, e.g. the ratio of impact through the exchange rates and impact through the interest rates. This ratio is commonly known as the MCI ratio. A ratio of – for example – 3 implies that a 3% change in the exchange rate corresponds to a 100 basis point change in the interest rate. Therefore, a high value of the MCI ratio implies that the exchange rate has relatively less impact on the economy. Consequently, one would expect to find larger values of the MCI ratio in larger, less open economies. Mayes and Virén (1998) summarize a number of studies on MCI ratios and find that in smaller and more open economies the ratio is often between 2 and 4, whereas in the

1 *A central bank may also have other instruments, and their relative importance could be assessed in the same way. In practice, other potential instruments are usually ignored in analysis.*

U.S.A. and Japan it is closer to 10. Interestingly for our case, in their own study they find MCI ratios of around 1 to 5 in most EU countries prior to Monetary Union, using the real exchange rate of the Deutsche mark. However, their (and others') MCI estimates are quite sensitive to the exact specification of the model used, which cautions us against making any firm conclusions based only on one set of results.

Several central banks have used the MCI as an indicator of the monetary stance (Gerlach and Smets, 2000). Among these are the Bank of Canada, the Reserve Bank of New Zealand[1]) and also the Bank of Finland, which have all made use of the MCI as a monetary policy indicator.

3 Data Description

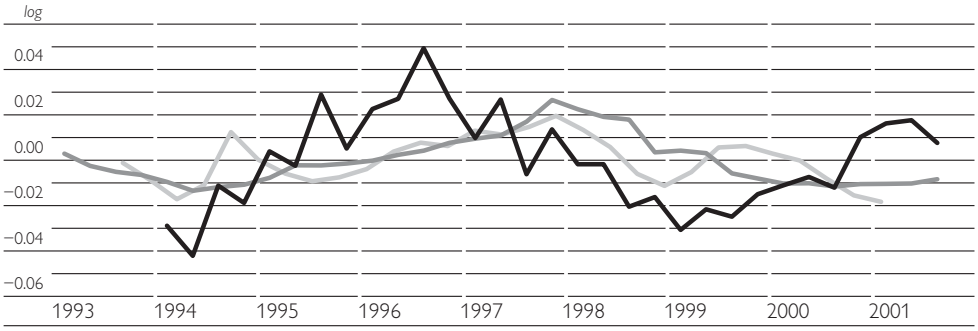
I use quarterly data for this estimation, starting from the first quarter of 1994 (earlier for some variables) and running until mid-2001. Basically, the estimation proceeds as in Mayes and Virén (1998), i.e. I estimate an IS curve for these countries. Using the same procedure allows a direct comparison with their estimates of the MCIs for the euro area countries before Monetary Union was established.

Quarterly GDP data were collected from national statistical authorities. The dependent variable in the empirical estimations is the output gap. Trend output is calculated by applying the Hodrick-Prescott filter to the logarithm of seasonally adjusted GDP series. The output gap is then calculated as the difference between actual output and trend output, i.e. a positive value means that the output is above its trend level. Other variables are taken from the IFS data base. Inflation is measured by the change in the logarithm of the consumer price index, and the measure used for interest rates is the central bank's key interest rate. The real effective exchange rate is taken directly from the IFS data base and it is defined so that an upward movement means an appreciation. The IFS data base reports the real effective exchange rate as an index where the average value of 1995 is taken to be 100. I use the natural logarithm of this index in the empirical specification. The real interest rate is defined as the ex post realized real interest rate, as we have no data on inflation expectations and consequently no way of measuring the ex ante expected real interest rate, which would obviously be more correct from a theoretical point of view.

1 *For an exposition of MCI in New Zealand, see Nadal-De Simone et al. (1996).*

Chart 1

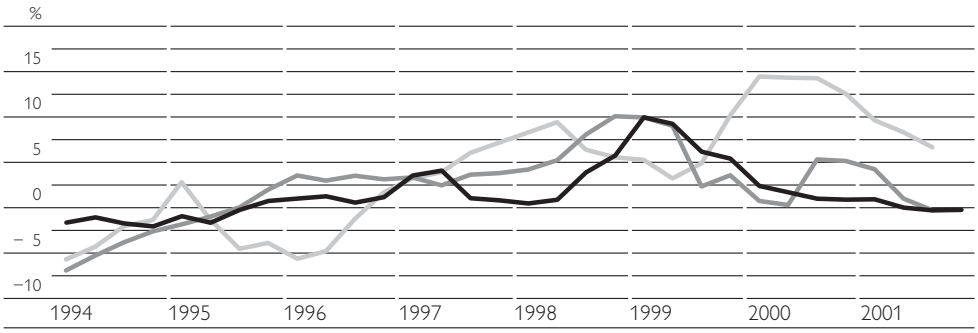
Output Gap



Source: Bank of Finland.

Chart 2

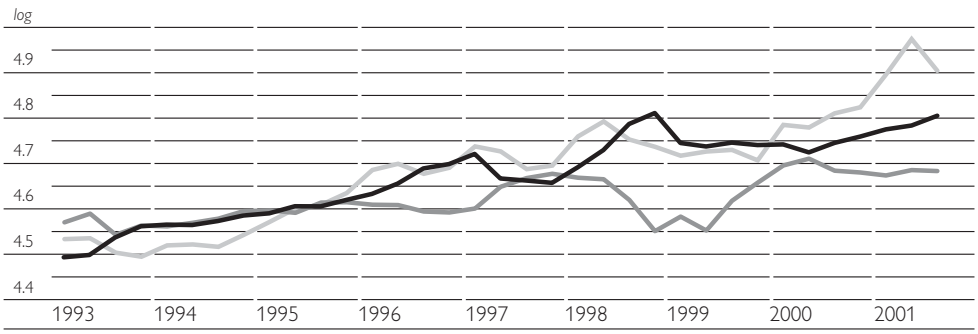
Real Interest Rates



Source: IMF, Bank of Finland.

Chart 3

Real Effective Exchange Rates



Source: IMF, Bank of Finland.

Charts 1 to 3 show the output gap, the real effective exchange rate and real interest rates. It is obvious that the output gap is by construction stationary, and there is no reason to suppose that real interest rates would follow a random walk, either. However, in all three countries the real effective exchange rate has clearly appreciated during the period under review. Statistical tests reveal that the zero hypothesis of a unit root cannot be rejected. Therefore the series would have to be differenced once to be rendered stationary. Alternatively, if one assumes that the observed trend appreciation of the real effective exchange rate is an equilibrium phenomenon, deviations from trend could be used as the exchange rate variable. In practice, experiments with both first differences and deviations from trend yielded no sensible results, and consequently these specifications were dropped, although using the nonstationary variable in the regression is not satisfactory from a theoretical point of view. On the other hand, using the level of the real exchange rate is consistent with other studies calculating MCI ratios.

4 Calculated Monetary Conditions Indices

MCIs and MCI ratios are calculated with the help of estimated IS curves. Real variables are used for the estimation, with the output gap being used as the dependent variable. The output gap is constructed for each country with the help of the Hodrick-Prescott filter, with the bandwidth parameter set to 1600, as is customary with quarterly time series. The output gap in turn is explained by its own lags and the lags of real interest rates and the real exchange rate. I also tried to add the output gap for EU Member States, but either it did not come out as significant or it was the only statistically significant variable, rendering the whole exercise pointless. Therefore I report only regressions without the EU output gap.

Table 1 reports estimations for the IS curves and calculated MCI ratios, including the level of the real effective exchange rate. In practice, estimations were started with four lags of all variables. The lag length of the individual variables was reduced one by one until the longest retained lag length was statistically significant, at a level of 10%, but in a way that at least one lag per specification was retained. One or two lags of interest rates and exchange rates were usually significant. In general, diagnostic tests for the regressions indicated no problems, despite the nonstationarity of the exchange rate variable.

Results for the Czech Republic are well in line with similar studies for other small, open economies. Both the exchange rate and interest rates are relevant for output. The Czech Republic's MCI ratio is quite low (2.7), implying that the relative effect of the exchange rate on output is quite high. On the other hand, the exchange rate for Slovakia seems to be clearly less important than domestic interest rates. However, since our sample period is so short, results could be driven by a small number of observations. For example, the real effective exchange rate of Slovakia depreciated markedly after the final quarter of 1998, as the currency was allowed to float. This step was preceded by a short period of strong appreciation, which was associated with a strong economic boom in Slovakia.

In Poland, the results are also somewhat perplexing. The MCI ratio comes to only 0.3, implying a very small economy where the exchange rate has large

effects on output. Again, there are several possible explanations for this result. Poland had some sort of an exchange rate peg for almost the entire sample period, which may have made the domestic economy more responsive to exchange rate changes. Also, the widespread use of other currencies in the domestic economy may produce similar results.

When comparing my results for three accession countries with those of Mayes and Virén (1998), I notice that in their estimations MCI ratios also differed widely across countries. The MCI ratios calculated for the Czech Republic and even for Slovakia are comparable to Mayes and Virén's estimates for the present euro area countries. Therefore, giving up their own currencies and joining Monetary Union would presumably not be any more difficult than it was for the current participating Member States. For Poland, the situation might be different if the exchange rate is truly as important for the Polish economy as my MCI ratio suggests. However, since I present only first estimates of MCI ratios and since the data sample is by necessity limited, these calculaotions must be taken very cautiously.

Table 1

Estimated IS Curves

Country (lags)	Y_{t-1}	Y_{t-2}	rr_{t-k}	re_{t-k}	R^2	MCI ratio
Czech Republic (1,2)	0.188 (1.080)	0.425 (2.550)	−0.175	−0.065	0.72	2.7
Slovakia (1,2)	0.985 (11.000)	–	−0.490	−0.002	0.88	23.1
Poland (1,1)	0.679 (4.900)	–	−0.008	−0.025	0.72	0.3

Source: Bank of Finland.

Notes: Y_t stands for the output gap, rr_t for the real interest rate, and re_t for the real effective exchange rate. For rr and re, the reported coefficients are calculated as the sum of all lags of the variable. The numbers in parentheses below the country name refer to the lag length of rr and re, respectively. Longer lags than two for the output gap itself are not reported.

5 Concluding Remarks

In this paper, I present a first attempt to calculate monetary conditions indices for three EU accession countries: the Czech Republic, Poland and Slovakia. It was found that for the Czech Republic, our calculations are well in line with related research on small OECD countries. More specifically, results do not differ from those obtained earlier for the present euro area countries. For Poland, the results indicate a surprisingly large influence of the exchange rate on output developments, which may be due to the exchange rate policy pursued during the 1990s. Also, the use of foreign currencies in domestic transactions may have increased the exchange rate's relative importance.

However, because of the limited time series I have at my disposal, my results must be treated with extreme caution. Obviously, further work on the issue will have to be conducted.

References

Gerlach, Stefan and Frank Smets. 2000. MCIs and Monetary Policy. European Economic Review 44 (9): 1677–1700.

Mayes, David and Matti Virén. 1998. The Exchange Rate and Monetary Conditions in the Euro Area. Bank of Finland Discussion Paper 27/98.

Mishkin, Frederic M. 1995. Symposium on the Monetary Transmission Mechanism. Journal of Economic Perspectives 9 (4): 3–10.

Nadal-De Simone, Francisco, Richard Dennis and Peter Redward. 1996. A Monetary Conditions Index for New Zealand. Reserve Bank of New Zealand Discussion Paper 96/2.