

Summary indicators of monetary conditions

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This article discusses how both interest rates and exchange rates need to be taken into account when assessing monetary conditions, and outlines an approach used by some commentators and central banks to combining both variables into a single indicator.

I Introduction

In recent years, there has been increasing recognition that monetary policy affects the economy, and ultimately the price level, through a number of channels. These channels, or "transmission mechanisms" include the effect of interest rates on saving and investment, the effect of exchange rates on demand for locally produced tradeable goods and services and on import prices, and the effect of all of these on expectations and, through expectations, on the economy more generally.

In keeping with these developments, most central banks now monitor a range of monetary indicators when assessing the overall stance of monetary policy. These indicators include, in particular, interest rates and exchange rates, rather than a single or narrow range of indicators, (eg, a benchmark interest rate, or a monetary aggregate) as was more typically the case in the 1970s and 1980s. An important driving force behind the need to adopt a broader view on how monetary policy affects the economy has been the process of financial deregulation and liberalisation which has taken place in recent years, and in particular, the liberalisation of foreign exchange transactions (abolition of exchange controls and the floating of exchange rates) and consequential globalisation of financial markets.

More specifically, when an economy's financial markets are integrated with those of the global economy, interest rates in the home country are affected by developments in the rest of the world. If people are free to buy financial assets wherever they choose, then we should expect rates of return on these assets to be equalised across countries when allowance is made for risk and expected exchange rate changes. For example, if the New Zealand dollar is expected to appreciate against the US dollar, then New Zealand dollar bonds can offer a lower rate of interest than comparable US dollar bonds. In a competitive market, the interest differential will almost exactly match the expected rate of currency change.

In an economy open to the rest of the world, therefore, a shift by the central bank in its monetary policy stance may not be reflected purely in interest rate increases. Instead the exchange rate (defined as the external value of the New Zealand dollar) may change in value. The extent to

which interest rates and the exchange rate adjust depends on what foreign interest rates are doing and, crucially, upon exchange rate expectations. Accordingly, monetary conditions in an open economy need to be viewed using a measure broader than just interest rates; account needs to be taken of interest and exchange rates together.

Many commentators and central banks now discuss monetary policy not in terms of either the interest rate or the exchange rate but in terms of 'monetary conditions'. The Bank of Canada, for example, has published indicators of Canada's monetary conditions (Freedman, 1995). Similar indicators have been published for Italy, Germany, France and the United Kingdom (International Monetary Fund, 1996). In New Zealand, commercial banks and financial institutions frequently discuss monetary policy in terms of overall monetary conditions and some have published monetary conditions indicators, which summarise interest and exchange rates in a single variable, a monetary conditions indicator (MCI).

Typically an MCI will consist of a linear combination (a weighted average) of a benchmark interest rate and of a summary measure of the exchange rate (typically the trade-weighted index of the exchange rates of New Zealand's major trading partners). Having these variables in the indicator means that the monetary policy channels operating through interest rates and exchange rates are allowed for. Moreover, whether a change in policy stance comes through interest rates or exchange rates is of lesser importance since both variables contribute to measured monetary conditions.

This article aims to give a broad overview of the fledgling monetary conditions indicator literature, focusing on how these indicators are built, the nature of the information they contain, and the qualifications which should be borne in mind in using and interpreting them.

We begin in section two by describing a simplified representation of key aspects of the economy. This representation is used to outline the important policy transmission channels through which the interest rate and the exchange rate operate. Section three illustrates how MCIs are built and introduces the term 'monetary conditions ratio'. The monetary conditions ratio is an important variable since it describes the relative importance of the interest rate and

exchange rate policy channels. In section four we discuss some of the issues which arise in relation to the use of MCIs in policy decision making. We explain how it is necessary to be able to measure actual monetary conditions, relative to 'desired monetary conditions' for MCIs to assist in the process of policy assessment and decision making. Section five provides some measures of past monetary conditions, while section six concludes.

II A simple exposition of the monetary policy transmission mechanism

Consider a tightening of monetary policy in New Zealand, brought about by Reserve Bank sales of government securities resulting in a reduction of settlement cash.¹ Following this reduction in settlement cash, some registered banks would find themselves short of settlement cash with which to settle their inter-bank transactions. As a result they would either have to bid for more cash in the overnight market or discount Reserve Bank bills (at a cost set by the Reserve Bank above the prevailing market yield). Either way the reduction in settlement cash would result in increases to the overnight cash rate.

These interest rate increases for short-term funds get transmitted to varying degrees throughout the yield curve as banks move their source of funding away from the short end of the yield curve. The exchange rate will also move in response to this tightening as the financial markets substitute away from foreign assets in favour of the now higher yielding New Zealand assets. The upshot of the policy tightening, then, is an adjustment to both interest rates and the exchange rate.

In the short-term at least, changes to the nominal interest and exchange rates will reflect similar changes to their real counterparts, with downstream implications for the real economy. Demand pressure, measured by the level of expenditure relative to potential output, will tend to ease as consumption, investment, and net exports weaken. Firms' investment will tend to decline both because higher interest rates raise the cost of investing and because the stronger exchange rate dampens foreign demand for their product. Consumer spending on domestically produced goods and services will fall away because of the higher interest rates, which encourage savings, and by the higher exchange rate, which encourages a switch to spending on imports. Monetary policy, then, has two channels into

demand pressure, the first through the real interest rate, the second through the real exchange rate.²

The exchange rate also has an effect on the price level more directly. Consumer prices consist of the prices of both traded and non-traded goods and services. Because New Zealand is largely a price taker in world markets, the traded goods and services price component may be thought of as determined by the law of one price. That is, the price of a tradeable good, say, a compact disc, should sell for the same NZ\$ price regardless of the country it is sold in. For example, if a compact disc sells for US\$15 in the United States, then, with an exchange rate of NZ\$1 = US\$0.65, the same compact disc should sell here for around NZ\$23. The law of one price, therefore, paves the way for a direct exchange rate effect into consumer prices. As the nominal exchange rate appreciates traded goods prices fall and hence so too do consumer prices. Thus, the larger the share of the tradeables sector of the economy, the greater will be the direct effect of the exchange rate on the overall price level,³ and correspondingly less important are the transmission mechanisms described above involving the effects of real interest and exchange rates on aggregate demand.⁴

To summarise, within this simple framework, the instruments of monetary policy have indirect effects on inflation through the real interest rate and real exchange rate channels into demand pressure, and a direct impact on the level of consumer prices through the nominal exchange rate channel which feeds into traded goods prices. This exposition has not dealt explicitly with the direct influence of monetary policy on expectations of inflation. It is arguable that this channel of influence is perhaps the most important in New Zealand, as running policy so that the commitment to maintaining inflation in the zero to two percent band appears credible will tend to make the other transmission mechanisms much more effective. A full specification of the relationships involved can capture this for an MCI. Through this inflation expectations channel, next year's expected policy stance can affect to-

1 Settlement cash comprises balances held by banks in their settlement accounts at the Reserve Bank.

2 In practice the effectiveness of this relationship varies from product to product (see Winkelmann and Winkelmann, 1995, for a study of the impact in New Zealand).

3 The importance of the direct exchange rate channel is reflected in the exchange rate 'passthrough' coefficient, estimates of which can be found in Beaumont, Cassino and Mayes (1994).

4 We are deliberately simplifying here and the lack of any discussion of the credit and other channels of influence (see Mishkin, 1995, for a survey) does not imply any adverse view about their existence in New Zealand.

day's inflation rate. An important implication of this expectations channel is that the expected duration of a policy change influences the effectiveness of the policy change in altering inflation.⁵

III The anatomy of a Monetary Conditions Indicator

As the name 'monetary conditions indicator' suggests, such indices attempt to capture the degree to which monetary policy is resisting inflation pressures in the economy. But the nature of the indicator built depends significantly on exactly which pressures monetary policy is resisting. To clarify matters, even though the Reserve Bank endeavours to keep annual inflation between 0 - 2 percent, this does not mean that monetary policy focuses on current annual inflation. Instead, to achieve this inflation objective, monetary policy must be forward-looking (to allow for the lags with which monetary policy operates) and concentrate on the driving forces behind medium-term inflation. For this reason, MCIs are normally thought of in terms of monetary policy's power over demand pressure, ie, the extent to which monetary conditions are bearing down on aggregate demand (or otherwise), rather than in terms of a direct relationship between monetary conditions and inflation.

Following the demand pressures approach, we can build up an MCI as a (linear) combination of the interest rate and exchange rate as follows:

$$MCI(v) = \alpha(r_t - r_b) + \beta(q_t - q_b) + 100.$$

The interest rate and the exchange rate today, t , are denoted r_t and q_t respectively, while the same variables in a chosen base period, b , are denoted r_b and q_b . The variable, v , in parentheses is the MCI focus, or target, variable which, as we indicated earlier, is generally a measure of demand pressure.⁶ The MCI has been normalised so that in the base period, when $r_t = r_b$ and $q_t = q_b$, it will equal 100.

5 It is the proper incorporation of this expectations channel which provides the greatest headache for estimating an MCI as it requires a model which includes how the central bank itself sets monetary policy.

6 Demand pressure is often measured by output growth or proxied by the output gap. The output gap is the difference between current output and the estimated level of output we would observe if the economy were in equilibrium.

It is important to appreciate, though, that the interest rate and the exchange rate are not the only variables that can be used when building an MCI. In fact a wide range of variables can be used, including, for example, the yield gap (between short- and long-term interest rates), bank lending growth, and the like. Indeed, any variable directly influenced by monetary policy which reflects a different channel through to inflation can, in principle, be included.

Having chosen the MCI target variable (demand pressure) as well as the variables entering the indicator (say, a benchmark interest rate and a summary measure of exchange rates), the weights and β need to be found to build the indicator. These weights should reflect the respective importance of the interest rate and exchange rate channels for monetary policy, and are usually determined through econometric estimation. Such an MCI, therefore, is empirically based, and hence can only be relied upon to the extent the underlying estimation is sound.⁷

The ratio of these weights, α/β , is termed the MCI ratio. The higher this MCI ratio, the more important the interest rate channel relative to the exchange rate channel in influencing the focus or target variable (aggregate demand). For example, an MCI ratio of 2:1 would indicate that a 1 percentage point movement in interest rates is equivalent, in terms of effect on aggregate demand, to a 2 percent movement in the exchange rate (in the same direction). Alternatively, such an MCI ratio would indicate that a 1 percentage point increase in interest rates, offset by a 2 percent fall in the exchange rate would leave monetary conditions, in terms of pressure on aggregate demand, unchanged.

One final consideration when building an MCI, is whether to include the interest rate and exchange rate in real or nominal terms. The Bank of Canada (Freedman, 1995) generally uses nominal magnitudes whereas the European central banks (Hansson and Lindberg, 1994) typically base their MCIs on real variables. In the short-term the distinction is probably of little importance. Movements to the nominal interest and exchange rates probably bring about similar movements to their real counterparts. But in the longer run the information content of the respective real and nominal variables can diverge. Due to the trend in the nominal exchange rate (brought about by the difference between foreign and domestic inflation), which is not present in the nominal interest rate, it is probably better to use real magnitudes where possible to prevent

7 In practice it is often difficult to get precise estimates of α and β using econometric estimation. The effectiveness of the channels of monetary policy can be hidden by data measurement errors and have been altered by New Zealand's economic reforms.

the nominal exchange rate from spuriously dominating the indicator.

IV How can an MCI help in assessing monetary conditions?

In broad terms, if the MCI is climbing through time, monetary policy is strengthening its stance against demand pressure. The same cannot be said for either the interest rate or the exchange rate alone. There are times when interest rates may be rising but monetary conditions are actually softening. Similarly for the exchange rate. To illustrate a scenario where this situation could arise, consider the implications of a change to investors' portfolio preferences, triggered, say, by a positive re-rating of the growth prospects for the economy. Such a re-rating would be likely to see capital flow into the country causing the currency to appreciate and, at the same time, yields on domestic bonds will naturally fall in order to stem the capital outflow. The outcome is lower interest rates but a higher exchange rate. The overall outcome for policy is ambiguous if policy makers focus individually on either the interest rate or the exchange rate. Quantifying the two channels collectively in an MCI, however, may give a better indication of the overall effect.

Central to the Reserve Bank's framework for assessing monetary conditions are comprehensive economic projections prepared at quarterly intervals. These projections are incorporated into the Bank's twice yearly *Monetary Policy Statements*, and are published separately for the intervening quarters. In addition to projecting a path for the economy for two years ahead, and in particular an inflation outlook, interest rate and exchange rate assumptions are also given. These assumptions serve as initial benchmarks against which developments in the following months - in terms of both the evolution of "monetary conditions", and the continued validity of the initial assumptions - can be assessed in the light of new information which comes to hand.

In principle, at each point in time there will be a level of monetary conditions that is desirable, or optimal, in the sense that it achieves the best possible outcome for monetary policy in light of the Bank's Policy Target Agreement objectives. The key, therefore, is to be able to establish desired conditions, that is, the level of monetary conditions consistent with monetary policy's objectives. However, since the economy is continually being buffeted by shocks (for example, changes in trading partners' economies and government policy changes), the policy maker faces a continuing stream of information, and hence desired conditions will also tend to change all the time. In light of this, an important task for policy makers is to identify shocks hitting the economy.

It is doubtful, though, whether policy makers can identify the shocks hitting the economy with sufficient accuracy or timeliness to be able to revise desired conditions precisely from day to day, or week to week. For this reason it is necessary to think in terms of a range within which monetary conditions may acceptably move. A re-assessment of the policy stance could be undertaken if actual monetary conditions range more widely, and an assessment made of whether actual monetary conditions have departed from desired conditions (necessitating policy action) or whether desired conditions have also moved (as the result of a "shock"). In this way the small daily fluctuations, which may in any case offset each other as time passes, can be neglected if they have no material impact.

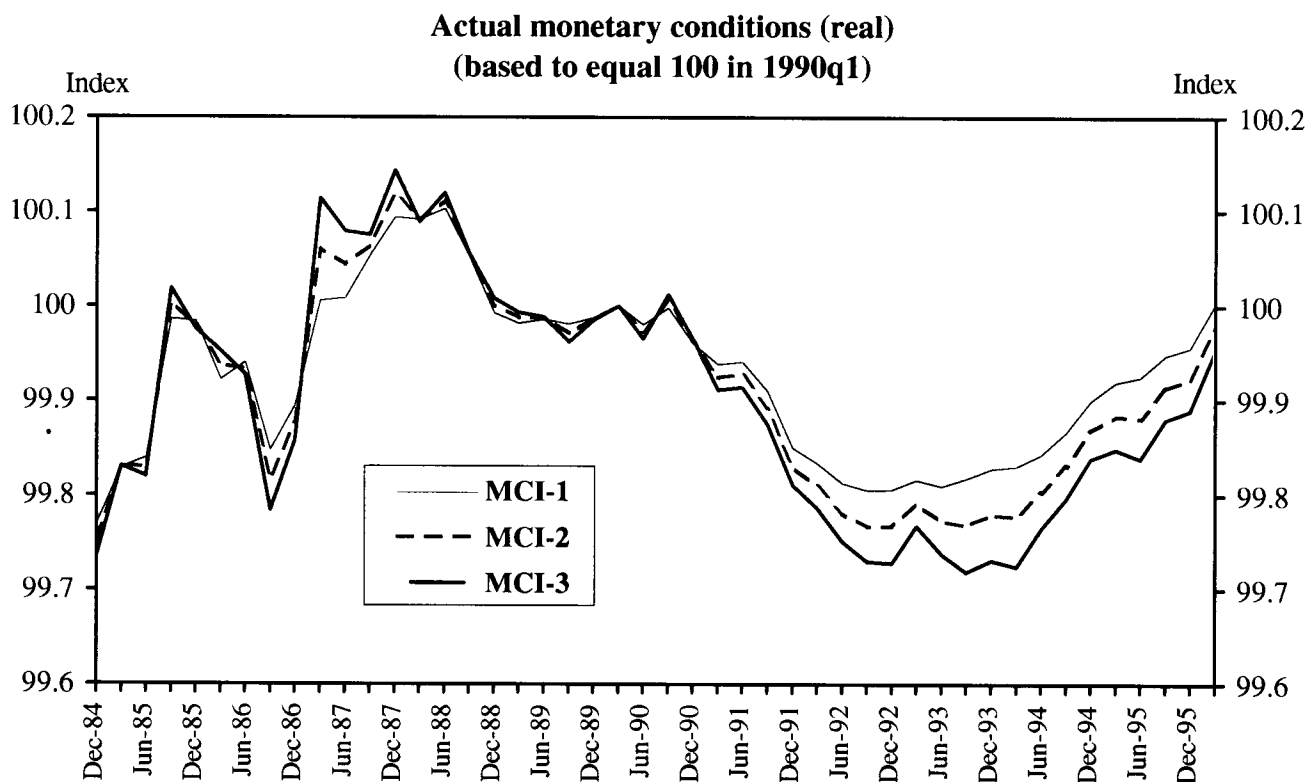
Monetary conditions indicators can assist in the making of these assessments, specifically by providing a framework within which divergent movements in interest and exchange rates can be weighed up. However, such a framework is not one which lends itself to mechanical application. For one thing, it needs to be borne in mind that MCIs typically are a summary measure of what usually are already summary variables: an exchange rate index (which can mask divergent movements in bilateral exchange rates) and a single, typically short term, interest rate (which abstracts from the term structure of interest rates). Also, the interest to exchange rate ratios estimated econometrically represent an average ratio over time, and may mask differences in the relative strength of interest and exchange rate effects, depending on actual conditions in the respective interest sensitive (investment) and exchange rate sensitive (tradeables) sectors of the economy at the time.

Moreover, the interest rate and exchange rate channels into demand pressure are not the only paths by which monetary policy affects inflation. As we noted earlier, there is also a direct nominal exchange rate effect as well as a channel through inflation expectations. To the extent that some monetary policy channels are overlooked in the construction of an MCI, it will not fully reflect the overall stance of monetary policy. Therefore, while an MCI can be a useful indicator of policy stance, it should be used carefully and alongside other indicators.

V Some illustrative MCI measures

Some idea of how monetary conditions have moved through time on an MCI basis is given in figure 1. The MCIs shown are based on interest rate to exchange rate ratios of 1:3, 1:2 and 1:1 which reflect the range of econometric results obtained within the Reserve Bank of New Zealand.⁸

Figure 1



Each MCI is a (linear) combination of the real 90 day bill rate and the (log of the) effective real exchange rate. Looking at figure 1 we observe first that the policy stories told by all three MCIs are basically similar. Monetary conditions were falling through 1986 before rising rapidly in late 1986 and early 1987. The firming of conditions in 1987 reflect the reduction in settlement cash that occurred at this time.

Between the end of 1990 and the end of 1992 all three MCIs indicated a softening in policy stance brought about by the speed with which inflation had come down and the weakness of the real economy, which suggested that future inflationary pressures were not high. In early 1993 there was a brief firming of conditions following a sharp fall in the exchange rate. At this time the Reserve Bank lowered the settlement cash target from \$20m to zero (the penalty discount rate on discountable Reserve Bank bills was also increased). The only other major event captured by these MCIs is the sustained increase in monetary conditions which commenced in 1994 and has lasted into 1996.

8 Generally speaking, MCI ratios tend to be smaller for small open economies (ie attribute more weight to the exchange rate) than for large, closed economies. We have seen, for example, MCIs for Canada based on a 1:3 ratio through to 1:10 for the United States (a much larger economy, which is relatively less open in the sense that the tradeables sector is quite small).

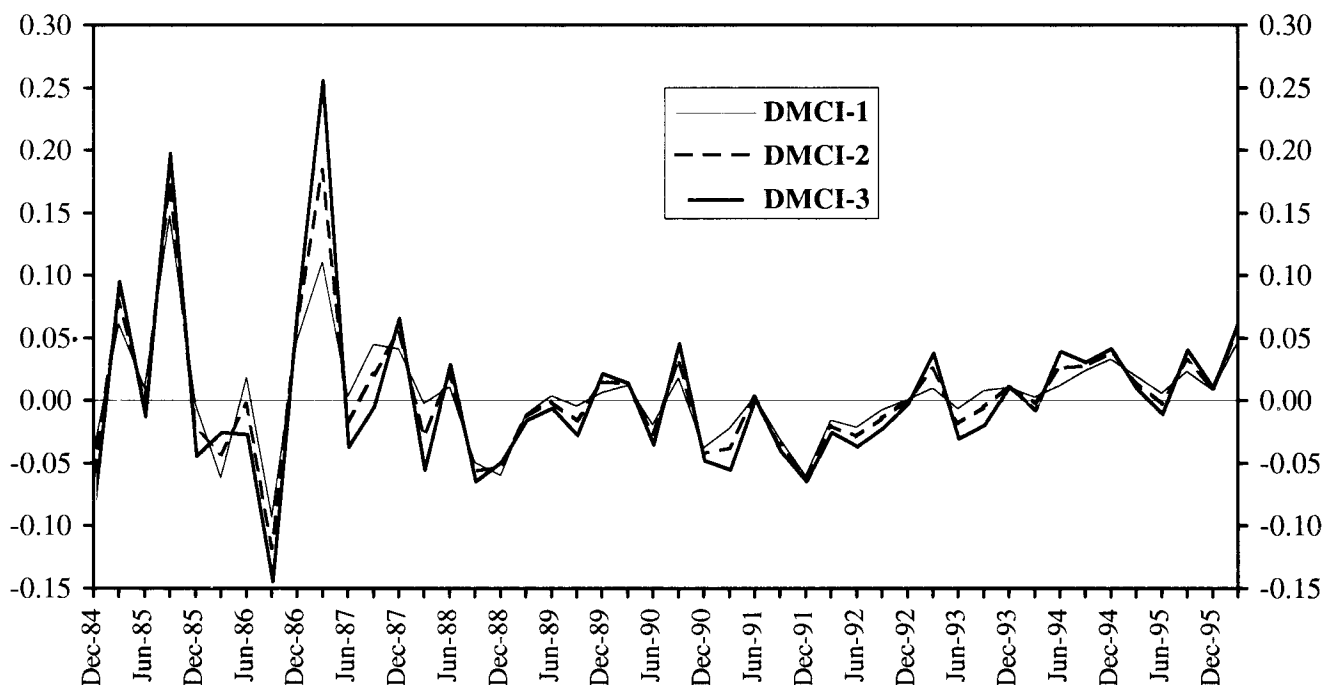
In figure 2, overleaf, where we plot the first difference of the three MCI curves shown in figure 1, we see that generally all three MCI curves in any given quarter have the same sign. This reveals that typically all three MCI curves tell a similar monetary policy story. One plausible reason for this feature is that a lot of the shocks hitting the economy are ones which move the interest rate and the exchange rate in the same direction. However, there are several quarters in which the MCI curves contradict each other, indicating the importance of knowing which MCI ratio is appropriate. An example where this happens occurs in early 1994 where the 1:1 MCI ratio (which places relatively more weight on the exchange rate) suggests that conditions have firmed, but the other curves, which place relatively more weight on the interest rate, indicate that monetary conditions may have actually have softened. June 1995 provides another similar example.

VI Concluding comment

In a small open economy like New Zealand's, neither interest rates alone, nor the exchange rate alone, can fully summarise the overall stance of monetary policy. A MCI represents one way of attempting to provide a more comprehensive indicator of the stance of monetary conditions by combining interest rates and the exchange rate in a way which reflects their influences on demand pressure. MCIs potentially can play a useful role in monetary policy

Figure 2

Quarterly change in actual monetary conditions (real)



assessment - both inside and outside the Bank - particularly in situations where individual policy indicators give contradictory signals. However, as for any summary measure, the simplifying assumptions and measurement uncertainties which lie behind their construction must be borne in mind. Nor should they be applied in a simple mechanical fashion, given that any assessment of monetary conditions needs to involve consideration of a wide range of monetary (and real economy) variables, and in the context of both what the stance of policy should be, as well as in relation to how actual monetary conditions compare with that desired stance. For these reasons the Reserve Bank has not, to date, adopted any particular MCI measure for monetary policy purposes, although the topic is the subject of on-going exploration and research.

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