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Comments on Edward Nelson, "The Future of Monetary Aggregates in Monetary Policy Analysis"[1]

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This is a very interesting paper about the role of money in monetary-policy analysis (Nelson (2003)). Ed Nelson is the ideal author of such a paper. He is a master of modern monetary economics, including New Keynesian analysis, being a student of Ben McCallum's and a coauthor with Ben of some of the pioneering contributions to the New Keynesian literature. Ed is also a master of more traditional monetarism, being also a student of Allan Meltzer's, and Ed is a very explicit admirer of Milton Friedman and Anna Schwartz.

Ed presents four questions to be answered:

(a) Do the New Keynesian models imply that *inflation in the long run* is governed by money growth, as stressed by the quantity theory of money?

(b) Can *inflation dynamics* in these models be given a conventional *quantity-theory* interpretation?

(c) Is the *basic transmission mechanism* of monetary policy in these models the same as that in pre-1990s models, which apparently gave a more explicit role to money?

(d) Finally, are there *aspects of the transmission mechanism* of monetary policy present in the pre-1990s work that could usefully be added to New Keynesian models?

Ed answers "yes" to all these questions. My answers to these questions are: (a) yes, but only if "governed by" is replaced by "correlated with"; (b) and (c) depend on the definition of the quantity theory; and (d) perhaps. In these comments, section 1 discusses the definition of the quantity theory (QT), section 2 examines the meaning of "always and everywhere a monetary phenomenon" (AEMP), and section 3 scrutinizes the role of money in the transmission mechanism of monetary policy.

[1] Comment on "The Future of Monetary Aggregates" by Edward Nelson for the November 2002 Carnegie-Rochester Conference, *Journal of Monetary Economics* 50 (2003) 1061-1070. I thank Kathleen Hurley for editorial and secretarial assistance.

1. What is the QT?

What is the QT? Friedman and Schwartz (1982) provide considerable discussion of the QT and seem to summarize the QT in three statements:

(1) The demand for money is demand for *real* money.

(2) The demand for real money is relatively *stable.*

(3) The supply of *nominal* money is *independent* of money demand.

This seems to be a more strict version of the QT than Ed presents. Of these statements, (1) is uncontroversial, I believe. Regarding (2), Ed chooses not to focus on the issue of the stability of money demand. He also notes that Rudebusch and Svensson (2002) have shown that stability of money demand is not an argument in favor of monetary targeting or a more explicit role for money. Statement (3) seems very controversial to me and will be discussed further below.

I believe one interpretation of the QT is that it involves a direct effect of nominal money on nominal aggregate demand. More concisely, the QT would have (log) nominal money supply, m_t, directly affect (log) *nominal* aggregate demand, $p_t + y_t$ (where p_t and y_t denote the (log) price level and (log real) output, respectively), whereas the Keynesians (and the New Keynesians) would have real interest rate, $r_t \equiv R_t - \mathrm{E}_t\pi_{t+1}$ (where R_t is the nominal interest rate, $\pi_{t+1} \equiv p_{t+1} - p_t$ denotes inflation, and $\pi_{t+\tau|t} \equiv \mathrm{E}_t\pi_{t+\tau}$ denotes the rational expectation in period t of inflation in period $t+\tau$), affect *real* aggregate demand, y_t. Here are a few quotes from Friedman and Schwartz (1982):

> [In a situation of excess supply of money,] [i]ndividuals will...seek to dispose of...their excess money balances... [on] the purchase of securities, goods, and services... The attempt to spend more...will lead to a bidding up of prices and perhaps also to an increase in output. (p. 18)
>
> [O]n an empirical level, it [the QT] is the generalization that changes in desired real balances (in the demand for money) tend to proceed slowly and gradually or to be the result of events set in train by prior changes in supply, whereas, in contrast, substantial changes in the supply of nominal balances can and frequently do occur independently of any changes in demand. The conclusion is that substantial changes in prices and nominal income are almost invariably the result of changes in the nominal supply of money. (p. 19)

> We regard the description of our position as "money is all that matters for changes in *nominal* income and for *short-run* changes in real income" as an exaggeration, but one that gives the right flavor of our conclusions. (p. 57)
>
> Keynesians regard a change in the quantity of money as affecting in the first instance "the" interest rate, interpreted as a market rate on a fairly narrow class of financial liabilities. They regard spending as affected only "indirectly" as the changed interest rate...affects total spending. We, on the other hand, stress a much broader and more "direct" impact on spending... (p. 57)

The above statements seem to support the view that the QT implies that nominal aggregate demand is more or less directly determined by nominal money supply. A simplified interpretation of this could be the following: Consider the quantity *identity* (as distinct from the quantity *theory*),

$$m_t + v_t \equiv p_t + y_t,$$

where v_t is (log income) velocity (of money). The simplest possible QT considers velocity more or less exogenous, or at least "to proceed slowly or gradually." Then, the quantity identity becomes an equation for nominal aggregate demand,

$$p_t + y_t = m_t + v_t,$$

where nominal aggregate demand, $p_t + y_t$, is determined more or less directly by the nominal money supply, m_t, for given more or less exogenous velocity, v_t. Clearly, Ed is not in favor of such a simple interpretation of the quantity theory. Perhaps, neither is Friedman and Schwartz, because the "direct" impact on spending may not be that direct, after all:

> The transmission mechanism we have stressed can be described as operating "through" the balance sheet and "through" changes in the interest rates. The attempt to restore or attain a desired balance sheet will tend to raise the prices of assets and reduce interest rates, which will encourage spending... This is how an initial effect on the balance sheet gets translated into an effect on income and spending. (p. 58)

So, in the end, what is the difference between monetarism and Keynesianism? Is it perhaps not the direct effect on spending, after all:

> The difference between us and the Keynesians is less in the nature of the process than in the range of assets considered... We insist that a far wider range of assets and interest rates must be taken into account—such assets as durable and semi-durable consumer goods, structures, and other real property. As a result, we regard the market rates stressed by the Keynesians as only a small part of the total spectrum of rates that are relevant.

This last quote is very much in line with Meltzer's (1995, p. 70) statement of "the basic insight of monetarism; monetary impulses set off a transmission mechanism that changes many relative prices and real variables until neutrality is (eventually) restored." This points to the role of the spectrum of rates of return that Ed discusses towards the end of his paper.

2. What does AEMP mean?

What does Friedman's (1963, 1992) famous statement, "substantial inflation is always and everywhere a monetary phenomenon," really mean? Similarly, what do expressions like "inflation is governed/pinned down by money growth" and the "monetary origins/source of inflation," mean? There are many such expression in Ed's paper. Do they just refer to a relatively high *correlation* between money growth, $\Delta m_t \equiv m_t - m_{t-1}$ and inflation, π_t? Such a correlation, I believe, is uncontroversial. Or, do these statements refer to *causality* from money growth to inflation? Such a causality, I believe, is controversial and sometimes wrong.

What can we say about the direction of causality between money growth and inflation? My view (which I think is uncontroversial) (Svensson (2002)), is that, generally, money growth and inflation are both endogenous variables and there is no clear direction of causality. In a dynamic general equilibrium, one can say that exogenous variables cause endogenous variables, but one cannot easily identify a direction of causality between simultaneously determined endogenous variables. However, the nature of the monetary-policy regime can in some cases make either money growth or inflation relatively exogenous relative to the other. For instance, consider strict money-growth targeting, where the central bank at all costs tries to stabilize money growth at a given target level, μ^*, regardless of what is happening to inflation and the rest of the economy. If the central bank is successful, average long-run money growth will equal the given money-growth target, $\mathrm{E}[\Delta m_t] = \mu^*$, where $\mathrm{E}[\cdot]$ denotes unconditional expectations. Indeed, in this case, the money supply would be independent of the demand for real money, as in the QT statement (3)

above.

By first-differencing the quantity identity and taking the unconditional mean, we get that average long-run inflation, $\mathrm{E}[\pi_t]$ will fulfill the identity

$$\mathrm{E}[\Delta m_t] + \mathrm{E}[\Delta v_t] \equiv \mathrm{E}[\pi_t] + \mathrm{E}[\Delta y_t].$$

Suppose we take the velocity trend, $\mathrm{E}[\Delta v_t]$, to be exogenous; the long-run average output growth to equal the long-run average potential output growth, $\mathrm{E}[\Delta y_t^*]$; and the latter to also be exogenous. Then, we could argue that long-run average inflation is determined by

$$\mathrm{E}[\pi_t] = \mu^* - \mathrm{E}[\Delta y_t^*] + \mathrm{E}[\Delta v_t],$$

where all the terms on the right side are exogenous to long-run average inflation. Then we could say that money growth (together with potential-output growth and the velocity trend) causes inflation.

Conversely, consider strict inflation targeting, where the central bank at all costs tries to stabilize inflation at a given target level of π^*, regardless of what is happening to money growth and the rest of the economy. If the central bank is successful, long-run average inflation will equal the target, $\mathrm{E}[\pi_t] = \pi^*$. Under assumptions about exogeneity of long-run average potential output growth and the velocity trend, we could argue that average money growth is given by

$$\mathrm{E}[\Delta m_t] = \pi^* + \mathrm{E}[\Delta y_t^*] - \mathrm{E}[\Delta v_t],$$

where all terms on the right side are exogenous to money growth. Then we could say that inflation (together with potential-output growth and the velocity trend) causes money growth. Nominal money supply would be "demand-determined" and not determined independently of real money demand. More precisely, a given real money demand and a given inflation target implies a given nominal money-demand growth, which in turns determines the nominal money-supply growth.

In order to express the above reasoning more precisely, consider the New Keynesian model presented by Ed, but let me modify it, as in Svensson (2003), so current output and inflation are predetermined. This eliminates some unrealistic simultaneity in the standard New Keynesian model. Then the aggregate-demand and aggregate-supply relations can be written

$$y_{t+1|t} = y_{t+2|t} - \sigma(R_{t+1|t} - \pi_{t+2|t} - \bar{r}) + \nu_{t+1|t}, \tag{2.1}$$

$$\pi_{t+1|t} - \bar{\pi} = \beta(\pi_{t+2|t} - \bar{\pi}) + \alpha(y_{t+1|t} - y^*_{t+1|t}) + u_{t+1|t}, \tag{2.2}$$

where $z_{t+\tau|t} \equiv \mathrm{E}_t z_{t+\tau}$ denotes the rational expectation in period t of any variable $z_{t+\tau}$ in period $t+\tau$, $\bar{r}$ is the average real interest rate, and ν_t and u_t are exogenous zero-mean demand and cost-push shocks, respectively. Furthermore, as in Svensson (2003), the model has been augmented by the assumption, as in Yun (1996), that, between optimizing price revisions, prices are indexed to the long-run average inflation (to be determined),

$$\bar{\pi} \equiv \mathrm{E}[\pi_t]$$

(this implies that the long-run Phillips curve has the attractive property of being vertical).

We can interpret the aggregate-demand equation, (2.1), as stating that private sector "plans" in period t for output one period ahead, $y_{t+1|t}$, are determined by expectations of: (1) output two periods ahead, $y_{t+2|t}$; (2) the real interest rate one period ahead, $R_{t+1|t} - \pi_{t+2|t}$; and (3) the demand shock one period ahead, $\nu_{t+1|t}$. The aggregate-supply equation, (2.2), states that inflation plans one period ahead, $\pi_{t+1|t}$, are determined by expectations of: (1) inflation two periods ahead, $\pi_{t+2|t}$; (2) the output gap one period ahead, $y_{t+1|t} - y^*_{t+1|t}$; and (3) the cost-push shock one period ahead, $u_{t+1|t}$. Actual output and inflation in period $t+1$ are then determined by the actual unanticipated shocks in period $t+1$ according to

$$\begin{aligned} y_{t+1} &= y_{t+1|t} + (\nu_{t+1} - \nu_{t+1|t}), \\ \pi_{t+1} &= \pi_{t+1|t} + (u_{t+1} - u_{t+1|t}). \end{aligned}$$

Finally, the model is augmented by the simple money-demand equation that Ed introduces,

$$m_t - p_t = c_0 + c_1 y_t + c_2 R_t + \eta_t, \tag{2.3}$$

where η_t is a zero-mean exogenous shock.

Suppose the central bank has an intertemporal loss function,

$$\mathrm{E}_t \sum_{\tau=0}^{\infty} (1-\beta)\beta^\tau L_{t+\tau},$$

where the period loss function corresponds to flexible inflation targeting with a given inflation target, π^*, and a relative weight, $\lambda > 0$, on output-gap stabilization,

$$L_t = \frac{1}{2}[(\pi_t - \pi^*)^2 + \lambda(y_t - y^*_t)^2].$$

The central bank's optimal policy can be characterized by the an optimal targeting rule for its target variable, inflation and the output gap, (an optimal first-order condition for this optimization problem),

$$\pi_{t+1|t} - \pi^* = -\frac{\lambda}{\alpha}\Delta(y_{t+1|t} - y^*_{t+1|t}). \tag{2.4}$$

That is, the expected "inflation gap" should be negatively proportional to the expected one-period-ahead change in the output-gap plans, with the proportionality coefficient λ/α.

Then, in equilibrium, the long-run average inflation will be determined by the inflation target

$$\bar{\pi} = \pi^*.$$

Furthermore, long-run money growth will be determined by the inflation target and long-run potential-output growth

$$\mathrm{E}[\Delta m_t] = \pi^* + c_1 \mathrm{E}[\Delta y_t^*].$$

Thus, we can say that long-run average money growth is caused by the given inflation target and the exogenous long-run potential-output growth. The central bank simply accommodates the long-run growth of nominal money demand at the target inflation rate.

Suppose instead that the central bank's period loss function corresponds to strict money-growth targeting with a given money-growth target, μ^*,

$$L_t = \frac{1}{2}(\Delta m_t - \mu^*)^2.$$

The optimal targeting rule will now be

$$\Delta m_t = \mu^*.$$

We can now say that long-run average inflation is caused by the given money-growth target and the exogenous long-run potential-output growth according to

$$\bar{\pi} = \mu^* - c_1 \mathrm{E}[\Delta y_t^*].$$

Here, the central bank is *not* accommodating any long-run growth of money demand but is simply targeting a particular money-growth rate, forcing inflation and the rest of the economy to adapt to that money-growth target.

I personally find this a very clarifying argument. It explains clearly under what special circumstances we can say that money growth causes inflation, or that inflation causes money growth.[2] Furthermore, the short-run correlation between inflation and money growth will depend on the parameters of the problem, the stochastic properties of the shocks, and the monetary policy pursued. Ed makes clear in this paper that he does not think very highly of this reasoning, for which I am somewhat disappointed.

[2] Here I am obviously using "cause" in the sense of "A causes B, if A is determined independently of B and B depends on A".

Ed states that AEMP "proposition amounts to the claim that for the central bank to allow a sustained change in inflation of g percentage points, it must allow the steady-state money growth rate to change by g percentage points." This, I believe, only refers to a correlation between two endogenous variables and not to any causality. Needless to say, if the central bank would *prevent* the steady-state money growth to change and instead keep it constant, this would force the inflation rate to adapt to the money supply. Then, money supply has become exogenous to inflation, and is indeed causing long-run inflation to stay put.

3. Money in the transmission mechanism?

In a footnote, Ed states that:

> Some readers might object to the use of terms such as "explicable by" or "governed by" money growth, given that the discussion here is intended to include the realistic case where money growth is not a univariate exogenous process. I would contend, however, that money growth can still be thought of as "explaining" or "governing" inflation in such cases, in the same sense that in Woodford's (2003) "neo-Wicksellian framework" for monetary analysis, the gap between the real interest rate and natural rate is regarded as governing or explaining inflation behavior.

Let me examine this statement more closely. Define the Wicksellian natural real interest rate, r_t^n, as the real interest rate consistent with output equal to potential output,

$$y^*_{t+1|t} \equiv y^*_{t+2|t} - \sigma(r^n_{t+1|t} - \bar{r}) + \nu_{t+1|t}.$$

It follows that we can write the aggregate demand relation in terms of the output gap, $x_t \equiv y_t - y_t^*$, and the real-interest-rate gap, $r_t - r_t^n$, as

$$x_{t+1|t} = x_{t+2|t} - \sigma(r_{t+1|t} - r^n_{t+1|t}).$$

Solving this equation forward, using that $x_{t+\tau|t} \to 0$ when $\tau \to \infty$, we get

$$x_{t+1|t} = -\sigma \sum_{\tau=0}^{\infty} (r_{t+\tau|t} - r^*_{t+\tau|t}).$$

Based on this equation, we might want to say that one-period-ahead output-gap plans are "determined by" ("caused by", "explained by", or "governed by") the term structure of expected

future real-interest-rate gaps. This interpretation is furthermore supported by the microeconomic derivation of this relation, in which individual consumers choose optimal individual consumption plans conditional on a sequence of expected future real interest rates that they take as given and beyond their control. We also note, that this is a very Keynesian rather than QT aggregate-demand relation, in that the sequence of expected *real* interest rates determines *real* aggregate demand, rather than *nominal* money supply determining *nominal* aggregate demand.

Furthermore, solving the aggregate-supply equation forward, using that $\pi_{t+\tau|t} - \bar{\pi} \to 0$ when $\tau \to \infty$, we get

$$\pi_{t+1|t} - \bar{\pi} = \sum_{\tau=0}^{\infty} \beta^{\tau}(\alpha x_{t+\tau|t} + u_{t+\tau|t}).$$

Based on this equation, we could say that the one-period-ahead inflation gap is determined by discounted expected future output gaps and cost-push shocks. Again, this interpretation is supported by the microeconomic derivation of this equation, in which individual firms choose optimal individual prices, taken as given the sequence of expected future aggregate demand, cost-push shocks and aggregate price levels.

Thus, altogether, we could say that expected future real-interest-rate gaps "determine" inflation, by first giving rise to a sequence of expected future output gaps and then this sequence of expected output gaps giving rise to inflation. Indeed, this can be described in terms of two "channels" in the transmission mechanism: an interest-rate channel to the output gap, and an output-gap channel to inflation.

Is there a similar channel for money in this model? Hardly. We could interpret m_t as referring to base money (and hence interpret the money-demand function as the private-sector's derived demand for base money) and state that the central bank has more or less complete control over the monetary base and that it uses the monetary base to implement the desired interest-rate each period. By the money-demand equation, (2.3), the nominal interest rate in period $t+1$ fulfills

$$R_{t+1} = -\frac{c_0}{c_2} + \frac{1}{c_2}m_{t+1} - \frac{1}{c_2}p_{t+1} - \frac{c_1}{c_2}y_{t+1} - \eta_{t+1}.$$

Here, p_{t+1} and y_{t+1} are predetermined (determined by private-sector decisions in period t), and η_{t+1} is exogenous. By controlling m_{t+1}, the central bank can control R_{t+1}. Since the relevant interest rate is the expected one-period-ahead interest rate, $R_{t+1|t}$, the central bank can in principle announce R_{t+1} in period t and make a commitment to set m_{t+1} in period $t+1$ so as to achieve that interest rate, once the predetermined variables p_{t+1} and y_{t+1} and the shock η_{t+1} are realized.

But, in this setup, the only role for money is to induce the desired nominal interest rate. From then on, we can describe the transmission mechanism in terms of the interest-rate channel to the output gap and the output-gap channel to inflation. There is no separate channel from money to the output gap or to inflation.

Furthermore, arguably, it is more relevant to interpret m_t as broad money, such as M3. In that case, m_t is not under perfect control of the central bank. In this interpretation, we must then consider the central bank to control R_t directly (interpreting R_t as a very short rate, such as a repo rate or an interbank overnight rate like the federal funds rate). Alternatively, we could add a market for base money, and model the relation between base money and the monetary base, and so forth. But if we take the shortcut of assuming direct central bank control over R_t, we do not need to refer to money at all in describing the impact of central bank actions on inflation and the output gap. We can then separate the money-demand equation from the (essential part of) the transmission mechanism, and note that money supply is determined separately, given p_t, y_t, R_t and η_t, and that the central bank implicitly accommodates any money demand at the desired interest rate.

Within this New Keynesian model and with the added money-demand equation, I think it is apparent that there is not much of a role for money in the transmission mechanism. Certainly, inflation seem to be "explained by" the output gap, and the output gap "explained by" the real-interest-rate gap, in a much more concrete and obvious sense than inflation or the output gap is explained by money.

Thus, by his choice of model, Ed actually seems to have stacked the cards very much against a strong role for money in the transmission mechanism. Furthermore, he does not believe that money-demand equations are very stable, nor that this is necessary for the QT (counter to what Friedman and Schwartz (1982) seem to say). Neither does he argue that money enters directly in the aggregate-demand relation (for instance, with a real-balance effect) or the aggregate-supply relation (for instance, with a "price gap" or a "real-money gap" as in the P^* model and Gerlach and Svensson (2003)). Finally, he does not consider money supply as determined independently of money demand, counter to the QT statement (3) above. What is left?

Could money have a role as a *measure of policy stance*? Clearly, money growth relative to a reference value, as in the unfortunate two-pillar strategy of the Eurosystem, does not seem to be a promising indicator of the policy stance. Perhaps the real-money gap, the measure of monetary overhang in Gerlach and Svensson (2003), would be less problematic. But in line

with the model above, the real-interest rate gap, $r_t - r_t^n$, for instance, as discussed in Neiss and Nelson (2003), seem to be a better indicator of monetary stance. Other better indicators of monetary stance are arguably the central-bank forecasts of the inflation gap and the output gap, $\{\pi_{t+\tau,t} - \pi^*\}_{\tau=0}^{\infty}$ and $\{y_{t+\tau,t} - y^*_{t+\tau,t}\}_{\tau=0}^{\infty}$, where $z_{t+\tau,t}$ denotes the central bank's forecast in period t of a variable $z_{t+\tau}$ in period $t+\tau$.

In this particular model, with the optimal targeting rule (2.4), the monetary-policy stance could arguably be measured as the deviation from this targeting rule, hence by

$$s_t \equiv \pi_{t+1|t} - \pi^* + \frac{\lambda}{\alpha}\Delta(y_{t+1|t} - y^*_{t+1|t}),$$

where a level of s_t above (below) zero might be interpreted as easier (tighter) policy than what is optimal.

Ed emphasizes that money could have a role in the transmission mechanism as a *proxy for a whole spectrum of rates of return*. In the real world, and in more elaborate models, there are many more asset prices than a single short interest rate (or a term structure of expected future short interest rates). These asset prices may have an essential role in the transmission mechanism of monetary policy. That may certainly be the case, and Ed provides some good arguments for that. However, an even better alternative would seem to be to extract those returns directly from asset markets. Money may indeed be a very blunt proxy of all those returns. If this extraction is possible, it would seem that this argument for a role for money has much less weight.

What about money as an *indicator variable*, which contains information about the state of the economy? At the end of his paper, Ed presents a model of an economy where the central bank has only partial information about the state of the economy. Furthermore, money is one of the observable variables that is correlated with the state of the economy. In such a situation, money contains some information about the state of the economy, and a rational central bank uses money together with other signals in its estimation of the underlying state of the economy. Indeed, to the extent that money has information about the underlying state of the economy, and thereby information about future inflation and output gaps, it makes perfect sense and is completely uncontroversial to use money as one indicator among others. Then, the weight money receives as an indicator is an empirical issue, without ideological overtones. This, I believe, is the potentially most useful role for money in monetary-policy analysis.

References

Friedman, M., 1963, Inflation: causes and consequences (Asia Publishing House, New York).

Friedman, M., 1992, Money Mischief (Harcourt Brace Jovanovich, New York).

Friedman, M. and A.J. Schwartz, 1982, Monetary trends in the United States and the United Kingdom: their relation to income, prices, and interest rates, 1867–1975 (University of Chicago Press, Chicago).

Gerlach, S. and L.E.O. Svensson, 2003, Money and inflation in the euro area: A case for monetary indicators? Journal of Monetary Economics, forthcoming.

Meltzer, A.H., 1995, Monetary, credit and (other) transmission processes: A monetarist perspective, Journal of Economic Perspectives 9(4), 49–72.

Neiss, K.S. and E. Nelson, (2003), The real interest rate gap as an inflation indicator, Macroeconomic Dynamics 7, 239–262.

Nelson, E., 2003, The future of monetary aggregates in monetary policy analysis, *Journal of Monetary Economics* 50, 1029–1059.

Rudebusch, G.D. and L.E.O. Svensson, 2002, Eurosystem monetary targeting: lessons from US data, European Economic Review 46, 417–442.

Woodford, M., 2003, Interest and prices: foundations of a theory of monetary policy (Princeton University Press, Princeton, forthcoming).

Svensson, L.E.O., 2002, A reform of the Eurosystem's monetary-policy strategy is increasingly urgent, Briefing paper for the Committee on Economic and Monetary Affairs, European Parliament, www.princeton.edu/∼svensson.

Svensson, L.E.O., 2003, What is wrong with Taylor rules? Using judgment in monetary policy through targeting rules," Journal of Economic Literature 41, 426–477.

Yun, T. (1996), Nominal price rigidity, money supply endogeneity, and business cycles," Journal of Monetary Economics 37, 345-370.