Comment on Michael Woodford, "Inflation Targeting and Financial Stability"*

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Michael Woodford's paper "Inflation Targeting and Financial Stability" presents a case for tighter monetary policy, "leaning against the wind," in order to reduce the probability of a financial crisis. However, the introduction of financial-stability instruments (macro-prudential instruments) that have a more direct effect on leverage than the policy rate allows monetary-policy and financial-stability policy to be conducted separately, with monetary policy focusing on the traditional objective of stabilizing inflation and resource allocation and financial-stability policy focusing on the objective of financial stability.

Michael Woodford's paper "Inflation Targeting and Financial Stability" Woodford (2012) presents a case for tighter monetary policy, "leaning against the wind," in order to reduce the probability of a financial crisis. However, the introduction in Woodford's model of financial-stability instruments (macro-prudential instruments) that have a more direct effect on leverage than the policy rate allows monetary-policy and financial-stability policy to be conducted separately, with monetary policy focusing on the traditional objective of stabilizing inflation and resource allocation and financial-stability policy focusing on the objective of financial stability.

As discussed in Svensson (2011), there is a risk of conceptual and practical confusion between monetary policy and financial-stability policy. For instance, it is sometimes stated that the objectives of monetary policy should be expanded to include financial stability and that monetary policy and financial-stability policy should be integrated and conducted together (Eichengreen, Rajan, and Prasad (2011), Eichengreen, El-Erian, Fraga, Ito et al. (2011)). Such suggestions are arguably inappropriate, since they do not take into account the fact that monetary policy and financial-stability policy are distinct and separate policies.

Monetary policy and financial-stability policy are distinct policies with different objectives and different instruments, and in many countries different public authorities have responsibility for them, in the same way as monetary policy and fiscal policy are different policies that have different objectives and instruments, and different authorities responsible

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for them. Fiscal policy has its objectives – such as economic stability, efficiency and an even income distribution – and its instruments – primarily taxation and spending – with the Ministry of Finance and in Sweden, the Riksdag (the Swedish parliament) as the authorities in charge. Monetary policy has its objectives – stable inflation and resource utilisation – its instruments – primarily the policy rate and communication – with the Riksbank as the sole authority in charge. Financial-stability policy has its objective – financial stability – and its instruments – primarily micro- and macroprudential supervision and regulation – with responsibility for this policy divided between Finansinspektionen (the Swedish Financial Supervisory Authority), the Riksbank, the Swedish National Debt Office (SNDO) and the Ministry of Finance. Furthermore, the decision frequency is different. In monetary policy, decisions are often taken 6-8 times a year. In fiscal policy and financial-stability policy, decisions may be taken 1-2 times a year.

Monetary policy is conducted taking the conduct of fiscal policy into account, and vice versa, as in a Nash equilibrium rather than a coordinated equilibrium. I believe that, in the same way, monetary policy should be conducted taking the conduct of financial-stability policy into account, and vice versa. They should be conducted this way regardless of whether the central bank has the sole authority of financial-stability policy or whether it is shared between several institutions.

Importantly, monetary policy and financial-stability policy should not be confused with one another. Confusion risks leading to a poorer outcome for both policies and makes it more difficult to hold the policymakers accountable. Trying to use monetary policy to achieve financial stability leads to poorer outcomes for monetary policy and is an ineffective way to achieve and maintain financial stability.

In a second-best situation, without appropriate supervision and regulation, if the policy rate is the only available tool and there is a trade-off between achieving the monetary-policy objectives and threats to financial stability, that trade-off should be taken into account. Normally, however, the policy rate is not the only available tool, and much better instruments are available for achieving and maintaining financial stability. Monetary policy should be the last line of defence of financial stability, not the first line.

Woodford (2012) sets up a New Keynesian model with credit frictions, a variant of the model in Cúrdia and Woodford (2009). It has an aggregate-demand relation (IS equation) of the form

$$y_t - g_t + \chi\Omega_t = \mathrm{E}_t[y_{t+1} - g_{t+1} + \chi\Omega_{t+1}] - \sigma(i_t - \mathrm{E}_t\pi_{t+1}). \quad (1)$$

Here y_t is the output gap, g_t is a composite of the various exogenous factors (such as government purchases) that shift the relation between (the marginal utility of) income and aggregate expenditure even in the absence of credit frictions, Ω_t is a measure of credit distortions such as a spread between borrowing and lending rates, E_t denotes expectations conditional on information available in period t, i_t is a short-term nominal interest rate, π_{t+1} is the rate of inflation between periods t and $t+1$, and all variables denote deviations from their steady-state values (so that constants are omitted). Under Woodford's proposed calibration, the coefficients satisfy $\chi, \sigma > 0$. In the presence of credit frictions, the variable i_t (a weighted average of the interest rates that are relevant for borrowers and savers respectively) is no longer identical with the central bank's policy rate, and this introduces an additional term if the aggregate-demand equation is instead to be written in terms of the policy rate, as in Cúrdia and Woodford (2009). Here that complication is omitted; for the purposes of the present discussion, it suffices that the i_t in (1) is a variable that the central bank can influence via the policy rate.

Under this calibration, real aggregate demand depends not only on exogenous factors (such as the evolution of government purchases) and the expected path of (average) real interest rates, but also on the magnitude of the distortions indicated by credit spreads; other things equal, a larger value of Ω_t will depress aggregate demand in period t.

The model's aggregate-supply relation (Phillips curve) takes the form

$$\pi_t = \varkappa_y y_t + \varkappa_\Omega \Omega_t + \beta \mathrm{E}_t \pi_{t+1} + u_t, \tag{2}$$

where the coefficients satisfy $\varkappa_y, \varkappa_\Omega > 0, 0 < \beta < 1$, and u_t is a is a composite term representing various possible exogenous "cost-push" factors. The credit frictions affect this relationship only through the appearance of the Ω_t term, again reflecting the way that changes in Ω_t shift the relationship between aggregate real expenditure and the marginal utility of income.

The variable Ω_t is assumed to take two values, a low value $\underline{\Omega}$ (a "normal" state) or a high value $\overline{\Omega}$ (a "crisis" state). Let γ_t be the probability of transition from the normal state to the crisis state. Woodford assumes that this probability is increasing in a state variable, L_t,

$$\gamma_t = \gamma_t(L_t), \tag{3}$$

where $\gamma_t(\cdot)$ is a function that satisfies $\gamma_t(L_t), \gamma'_t(L_t), \gamma''_t(L_t) > 0$. The time subscript on the function allows exogenous shifts in the function over time. The state variable can be interpreted as a measure of leverage in the financial sector. Furthermore, postulate a law of motion for the state variable of the form

$$L_t = \varrho L_{t-1} + \xi y_t + v_t, \tag{4}$$

where v_t is an exogenous disturbance and the coefficients satisfy $0 \leq \varrho < 1, \xi > 0$. That is, leverage depends positively on lagged leverage and the current output gap and is also subject to exogenous disturbances. In a more realistic case, the state variable affecting the probability of a financial crisis is a vector that includes not only leverage but, for instance, maturity mismatch and liquidity mismatch.

The social loss function is

$$\frac{1}{2}\mathrm{E}_t\sum_{\tau=0}^{\infty}\beta^{\tau}(\pi_{t+\tau}^2+\lambda_y y_{t+\tau}^2+\lambda_{\Omega}\Omega_{t+\tau}^2). \tag{5}$$

The first two terms in (5) correspond to the standard objectives of flexible inflation targeting, to stabilize inflation around an inflation target and resource utilization around a sustainable level. The last term represents the welfare effects of the credit frictions. Welfare is lower in the crisis state with a higher value of Ω_t than in the normal state .

Thus, a higher output gap is assumed to increase the probability of a financial crisis. A case for tighter monetary policy, "leaning against the wind," in order to, everything else equal, reduce the output gap and thereby leverage and the probability of a financial crisis obviously follows from these assumptions. Everything else equal, tighter monetary policy will reduce the output gap and thereby leverage and the probability of a financial crisis.

However, the introduction in Woodford's model of financial-stability instruments such as capital requirements, possibly cyclical ones, would allow leverage to be controlled more directly than indirectly and bluntly by the policy rate via the output gap. This modification allows the introduction of financial-stability policy (macro-prudential policy) and suggests that monetary policy and financial-stability policy can be conducted separately, with separate objectives and separate instruments.

Thus, introduce a financial-stability instrument (a macro-prudential instrument), f_t, that has a direct effect on leverage, and assume that the law of motion for leverage is modified to be of the form

$$L_t=\varrho L_{t-1}+\xi y_t+f_t+v_t. \tag{6}$$

Now we can distinguish monetary policy and financial stability policy. We first write the social loss function as

$$\frac{1}{2}\mathrm{E}_t\sum_{\tau=0}^{\infty}\beta^{\tau}(\pi_{t+\tau}^2+\lambda_y y_{t+\tau}^2)+\frac{1}{2}\mathrm{E}_t\sum_{\tau=0}^{\infty}\beta^{\tau}\lambda_{\Omega}\Omega_{t+\tau}^2.$$

Second, we assign financial-stability policy to use the instrument f_t to minimize

$$\frac{1}{2}\mathrm{E}_t\sum_{\tau=0}^{\infty}\beta^{\tau}\Omega_{t+\tau}^2 \tag{7}$$

subject to (6). Third, we assign monetary policy to use the policy rate to control i_t and minimize

$$\frac{1}{2}\mathrm{E}_t\sum_{\tau=0}^{\infty}\beta^{\tau}(\pi_{t+\tau}^2+\lambda_y y_{t+\tau}^2) \tag{8}$$

subject to (1) and (2).

For concreteness, assume that there exists a level of leverage, $\underline{L}$, such that the resulting probability of a financial crisis, $\underline{\gamma}\equiv\gamma_t(\underline{L})$; is so small that the risk of a financial crisis is not considered a problem. Alternatively, assume that below some level of leverage, $\underline{L}$, the probability of a financial crisis becomes independent of leverage. Then the function $\gamma_t(L_t)$

has the property that $\gamma_t(L_t)$ takes a minimum level $\gamma_t = \underline{\gamma}$ for levels of leverage less than or equal to $\underline{L}$, whereas it is increasing and convex for values of L_t above $\underline{L}$,

$$\gamma_t = \underline{\gamma} \text{ for } L_t \leq \underline{L},\ \gamma'_t(L_t),\ \gamma''_t(L_t) > 0 \text{ for } L_t > \underline{L}. \tag{9}$$

For either of these assumptions, it is then clear that the optimal financial-stability policy is to set f_t so as to keep L_t at or below the level $\underline{L}$. It follows that the optimal financial-stability policy is to set the financial-stability instrument according to

$$f_t \leq f(y_t, v_t, L_{t-1}) \equiv \underline{L} - \varrho L_{t-1} - \xi y_t - v_t.$$

This keeps the probability of a financial crisis at a small acceptable level or at its minimum level, depending on which assumption is used. Thus, financial-stability policy needs to adjust to past leverage, the current output gap, and disturbances to leverage.

Note that financial-stability policy in the form of $f_t = f(y_t, v_t, L_{t-1})$ in this simple case results in a reduced-form law of motion for L_t that is simply

$$L_t = \underline{L}.$$

In this simple case, financial-stability policy has been able, by adjusting f_t in response to the output gap, lagged leverage (which when this financial-stability policy has been implemented in the past will also equal $\underline{L}$), and disturbances to leverage, to change the reduced-form coefficients ϱ and ξ in (4) to zero and has also been able to neutralize the effect on leverage of the disturbances v_t. Financial-stability policy may also employ various measures to reduce the probability of a financial crisis, which can be represented by lowering $\gamma_t(L_t)$ for given leverage. It may also be able to make the probability of a financial crisis less sensitive to the level of leverage by lowering the first derivative, $\gamma'_t(L_t)$. In addition, policy may be able to reduce the impact of a financial crisis on the economy, which in this model would correspond to lowering the level of credit frictions in the crisis state, $\bar{\Omega}$.

This provides an example of how monetary policy and financial-stability policy can be separated, based on the realistic assumption that financial-stability policy has access to instruments that can more directly affect leverage and the probability of a financial crisis than the monetary-policy instrument(s). In this particular example, financial-stability policy needs to take the effects of monetary policy on the output gap into account, since the output gap is assumed in (6) to have an effect on leverage. Monetary policy needs to take the effects of financial-stability policy on financial frictions, Ω_t, into account, since financial frictions enter the aggregate-demand and aggregate-supply curves, (1) and (2). Given that, each policy can be conducted separately, with different objectives and different instruments. This is regardless of whether the central bank is in charge of both monetary policy and financial-stability policy or whether the central bank is in charge of monetary policy only and there is a separate authority in charge of financial-stability policy.

In the realistic case when the state variable affecting the probability of a financial crisis is a vector that includes not only leverage but, for instance, maturity mismatch and liquidity mismatch, it is even more the case that additional financial-stability instruments such as restrictions on maturity and liquidity mismatches are superior to the policy rate in achieving and maintaining financial stability.

References

Cúrdia, Vasco, and Michael Woodford (2009), "Credit Frictions and Optimal Monetary Policy," BIS Working Paper 278.

Eichengreen, Barry, Mohamed El-Erian, Arminio Fraga, Takatoshi Ito, Jean Pisani-Ferry, Eswar Prasad, Raghuram Rajan, Maria Ramos, Carmen Reinhart, Helene Rey, Dani Rodrik, Kenneth Rogoff, Hyun Song Shin, Andres Velasco, Beatrice Weder di Mauro, and Yongding Yu (2011), "Rethinking Central Banking," Committee on International Economic Policy and Reform, www.brookings.edu.

Eichengreen, Barry, Raghuram Rajan, and Eswar Prasad (2011), "Central Banks Need a Bigger and Bolder Mandate," Financial Times October 24, 2011.

Svensson, Lars E.O. (2011), "Monetary Policy after the Crisis," Speech at the Federal Reserve Bank of San Francisco, November 29, 2011, www.larseosvensson.net.

Woodford, Michael (2012), "Inflation Targeting and Financial Stability," *Sveriges Riksbank Economic Review*, 2012:1.