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Commentary

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The first question addressed in Robert G. King and Alexander L. Wolman's article is, What is the optimal inflation rate in a world where prices are "sticky"? (I will precisely define the term *sticky* later.) The authors find that for their model world, the optimal inflation rate is remarkably near the Friedman rule of deflating at the real interest rate (that is, deflating at a rate that results in a zero nominal interest rate). The second question addressed is, What is the response to a permanent technology shock if monetary policy is such that the inflation rate is constant? King and Wolman find that the response is essentially the same as that in a world with flexible prices. Thus, responses to permanent or highly persistent technology shocks are essentially optimal with inflation rate targeting.

These findings suggest that even in worlds with sticky prices, targeting inflation at a low or even a negative rate is a good policy rule. An added advantage of a policy that targets inflation rates is that inflation rates are predictable: There are no undesirable fluctuations induced by price surprises.

I first review the abstraction King and Wolman used in the study. Then I comment on the reasonableness of this abstraction for the purpose it is used. Finally, I discuss the practicality of an inflation rate targeting policy rule.

THE ABSTRACTION

Preferences in the model are standard with a large number of type-identical households. A representative household's utility function is the expected discounted value of utility flows that depend on consumption and leisure flows. The household allocates its time among leisure, shopping activities, and market activities. The motive for holding money is to economize on shopping time. Relying on the results of Goodfriend and McCallum (1987), King and Wolman assume that shopping time is an increasing function of the ratio of consumption to money holdings. In particular, with more real money holdings, less time is needed for shopping. The household side of the model is clearly specified.

The technology side of the model, however, is not clearly specified. As a result, King and Wolman may not have used the technology I describe. With this caveat, I interpret the technology as follows. A large number of intermediate technologies or firms exist. Each firm produces a different intermediate good using labor and firm-specific capital inputs. These technologies display constant returns to scale. Each firm has an associated technology for producing its firm-specific capital. A firm's capital depreciates in the usual way, namely, exponentially. The increment to capital, however, is not new investment, as there are adjustment costs. The increment-to-capital formation is homogeneous of degree one in current firm-specific capital and a firm's current investment. A firm has monopoly power; however, because a firm is small, its decisions have no general equilibrium effects. The intermediate goods are used to produce a composite good allocated between consumption and investment uses. The technology to produce the composite good is the usual one with constant returns to scale.

So far, there are two features of King and Wolman's model that are not part of the standard real business cycle model. These features are a monopolistically competitive intermediate goods sector and a transaction role for real cash balances, each of which previously has been intro-

duced separately. Hornstein (1993) and Devereux, Head, and Lapham (forthcoming) have carried out quantitative analyses with monopolistic competition. Cooley and Hansen (1989) have introduced money via a cash-in-advance constraint that for all practical purposes is equivalent to introducing money as a mechanism to economize on shopping time. If prices are flexible, introducing either feature to the standard model does not alter the conclusions of real business cycle theory. I am sure that introducing both features simultaneously would not alter the conclusions of real business cycle theory, given that I can think of no reason their effects would not be additive.

In models with sticky prices, however, the interaction between monopolistic competition and a transaction technology could well alter the conclusions drawn from flexible price models. The way King and Wolman introduce sticky prices is to assume that at each point in time, with some probability, the agent operating an intermediate goods technology has the opportunity to change the price of the good being produced. The opportunities to change prices are identically and independently distributed across the intermediate goods technologies and over time. All households own equal shares of all the technologies and there are equal lump-sum taxes or transfers to the type-identical households.

Before I proceed with substantive comments, I must address one technical problem. The state of a monopolistic competitive firm must specify:

- Whether its nominal price can be changed in the current period
- Its previously charged price if it cannot change its nominal price for the current period
- Its beginning-of-period, firm-specific capital

The state of the economy must specify the entire distribution of the monopolistic, competitive firms' states, as well as the aggregate capital stock, the stock of money, and the current value of the technology shock. Computing the equilibrium of model economies with both aggregate uncertainty and a distribution as part of the state variable has proved difficult. If corners are not a problem and functions are reasonably smooth, we can use recursive competitive equilibrium model economies that are linear-quadratic and have the desired steady states and desired substitution elasticities at the steady-state values.[1] When this is not the case, other methods are needed. The only method I know of is the one in Krusell and Smith (1995). King and Wolman appear to be implicitly assuming that a particular low-dimensional element suffices to summarize the relevant aspects of the distribution to an adequate degree of precision. This is a feature of the Krusell-Smith approach as well. Krusell and Smith carry out some tests to determine whether the statistics used are sufficient for all practical purposes. I think King and Wolman should have carried out such tests.

THE REASONABLENESS OF THE ABSTRACTION

I turn now to the substantive comments. How effective is the transaction-based model of money used by King and Wolman for evaluating an inflation rate targeting policy? An implication of transaction-based models is an empirical demand-for-money relationship. There are, in fact, large and persistent deviations from the demand-for-money relationship.[2] If these deviations were not present, I would have more confidence in the authors' conclusions.

Another deviation I find bothersome is the counterfactual prediction of the theory for the difference between the average returns on capital and the return on short-term government debt. King and Wolman's model implies that the return on government debt should be almost as

[1] See Hansen and Prescott (1995) and Ríos-Rull (1995).

[2] See Lucas (1993).

high as the average return on capital in the economy. This is not the case. Looking at the results of Kravis (1959), I note that the average return on capital (computed as the total capital income divided by the current value of the capital stock) is a little under 5 percent. The average real return on liquid government debt is much lower—about 1 percent. I see this difference as a big and bothersome discrepancy for representative household models used to evaluate monetary policy.

Another problem is that the monetary aggregate King and Wolman use does not correspond well to their theory. The theory has households holding non–interest-bearing money, while the monetary aggregate used in the demand-for-money function is M1. Most of M1 is not non–interest-bearing debt held by households. Only a third of M1 is currency and half of that is probably held abroad. Another third is demand deposits held by businesses, which often earn interest de facto. Households do not use these demand deposits to economize on shopping time. The final third is demand deposits held by households that, at least in recent years, can pay interest.

One feature of reality from which the authors deviate is that households enter into explicit and implicit contracts based on expectations of future relative prices. Sometimes realizations greatly vary with expectations, and some parties to the contracts are unable to fulfill them. These defaults in turn lead to additional defaults. In such situations, with no inflation, there might be a financial crisis and large economic disruptions. Because it has a representative household, the King and Wolman model cannot have financial crises of this type. Whether inflation rate targeting is a good policy in worlds with heterogeneous households and credit systems playing a crucial role in the operation of the economy is an interesting open question. At a minimum, I suspect that good policy would be characterized by relatively stable interest rates, as well as stable inflation rates.

THE PRACTICALITY OF INFLATION TARGETING POLICY

I turn now to the question, How can the monetary authorities target the price level? King and Wolman do not address this question, but it must be addressed if an inflation rate targeting policy rule is to be followed. The experience of New Zealand, a country that follows an inflation rate targeting policy rule, is relevant to this question. The Reserve Bank of New Zealand Act of 1989, pursuant to the 1992 Policy Target Agreement Document, specifies an inflation rate target of zero to 2 percent consumer price index inflation. The 1989 legislation made the pursuit of price stability the primary (and only macroeconomic) objective of the New Zealand Reserve Bank. Subsequent to the 1992 agreement, which incidentally specified that the governor of the Reserve Bank would be fired if he failed to keep the inflation rate within the target range, the inflation rate has been within the zero to 2 percent range.

New Zealand's experience suggests that a central bank can maintain price stability if no financial crises arise. Basically, the rule that the New Zealand government follows is to set the short-term interest rate above the long-term rate if the recent inflation rate has been near the maximum of the targeted range. Similarly, if the recent inflation rate is near the minimum of the targeted range, the short-term interest rate is set below the long-term rate. Subsequent to the signing of the agreement, price stability has characterized the New Zealand economy. However, the New Zealand government has maintained a budgetary surplus during this period. Whether the New Zealand Reserve Bank could have successfully targeted the inflation rate if there were government deficits of a significant magnitude remains unanswered.

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