Commentary

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We are very pleased that Lars Svensson refers to us as "good friends," for we certainly view him in that manner. We therefore regret that we have little agreement with the manner in which he has represented the arguments in our paper (McCallum and Nelson, 2005). To begin with, to characterize our paper as "destructive" is, we believe, not justified by the content of the paper. One of its main purposes is to recognize and emphasize that there is no single approach to policy rule analysis that is uniquely legitimate; targeting rules are appropriate and convenient for some problems, whereas instrument rules are for others. That this is our position should be clear from our previous writings, from the explicit passage on our page 598,[1] and from the fact that over half of our paper—Sections 5 and 6—is devoted to analysis showing that instrument rules can be used to approximate targeting rules as closely as desired. In what sense is any of this "destructive," rather than merely expressing a somewhat different, more eclectic, approach to policy rule analysis? Also, to suggest that we are engaged in a "struggle against targeting rules" is to suggest something that we could not imagine that Lars would believe, especially because we use targeting rules in our own work—e.g., McCallum and Nelson (2004) and Jensen and McCallum (2002).

On his p. 613, Svensson emphasizes that "there is now a rapidly growing literature by many authors that successfully applies targeting rules to monetary policy analysis" and hints that historical inevitability is on his side (page 613, paragraph 2). We agree that an increasing fraction of monetary policy rule analysis is based on targeting rules, but this fact does not settle any of the actual issues. In Svensson's passages, for example, there is a good bit of appealing rhetoric but no indication of how a study is judged to be "successful." Besides, there are many types of contemporary phenomena that seem inevitable yet highly undesirable.

In his footnote 3, Svensson says that we "seem to believe that no central bank is using a targeting rule and that a central bank needs to announce an explicit loss function to use a targeting rule," which he denies. But in this regard, it is important to note that our paper interprets a targeting rule as definitionally given by optimality conditions with respect to a particular objective function and particular model. Our justification for this stated limitation is based on Svensson's

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[1] "It is not our intention to argue that analysis with instrument rules is in all respects preferable to the use of targeting rules. Even if we held that belief, moreover, we would not think it socially desirable for all researchers to employ the same approach."

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practice as well as his several writings on the subject prior to his *Journal of Economic Literature* paper (2003a). It is adopted explicitly in our paper—see footnote 6.

INVALID ANALOGY WITH CONSUMPTION THEORY

In his Section 2, Svensson makes the observation, with which we agree fully, that it is desirable to model consumption decisions—and, for that matter, all other private sector spending and pricing decisions—as reflecting optimizing behavior by private agents in the economy. But Svensson's conclusions about the implications of this observation for modeling central bank behavior constitute a non sequitur. Dynamic general equilibrium theory implies that valid policy analysis—for example, working out the implications for inflation or output gap variability of a particular monetary policy rule—*always* requires modeling the private sector as optimizing. By contrast, how central bank behavior should be modeled depends on the purpose of the analysis. If the intention is to work out the effects of a constant money growth rule, then the central bank should be modeled as following a constant money growth rule. If the intention is to work out the effects of a fixed exchange rate regime, the central bank should be modeled as pursuing a fixed exchange rate. And if the intention is to work out the effects of the regimes that we observe in practice, the analyst should strive to model central bank behavior realistically.

Svensson, of course, argues that the most realistic characterization of inflation targeting is as a targeting rule. We have presented evidence that casts doubt on this characterization and have argued that an instrument rule characterization of actual central bank behavior is preferable. To emphasize, we argued that this was a valid characterization of the manner in which some inflation-targeting central banks actually carried out their policy decisions. We rested our argument not on the "descriptive" grounds Svensson attributes to us—i.e., on the ex post reduced-form relationships between the monetary policy instrument and

other variables—but on documentation produced by these inflation-targeting central banks of their practices and on the support that that evidence provides for an instrument rule interpretation of policy.[2] If our claim is valid, then the appropriate means of carrying out a structural analysis of inflation targeting is to use a model that combines the private sector's optimality conditions with an instrument rule (possibly including expectational terms) estimated over the period of inflation targeting. There is no internal inconsistency, or irony, in following this procedure. Rather, the procedure takes into account the necessary condition for a valid structural model (i.e., private sector optimizing behavior), while also using the policy rule specification that is the best approximation of actual practice.

FRIEDMAN'S *k*-PERCENT RULE

In his latest discussion, Svensson goes beyond his argument that targeting rules closely describe the practice of inflation-targeting central banks, to claim that even "Friedman's *k*-percent rule is a *targeting* rule!" (2005, p. 614). A more careful consideration of Friedman's own description of his proposed rule, however, rules out a targeting rule interpretation.

Svensson argues that, because Friedman's proposal involves targeting growth in a definition of the money supply that includes commercial bank deposits, the targeted variable is necessarily out of direct control of the central bank. Therefore, he contends, the effort of the central bank to target a monetary aggregate can be characterized as a targeting rule. But the specifics of Friedman's proposal clearly contradict targeting rule practice. Consider first the specific proposal for the *k*-percent money growth rule outlined in Friedman

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[2] This documentation included evidence that inflation-targeting countries viewed discretionary adjustments to policy as adjustments to the settings implied by an instrument rule. The implication of this for our discussion of Svensson is that, contrary to the suggestions of Svensson (2003a), central banks' use of "judgment" is not evidence in favor of targeting rules over instrument rules as a characterization of inflation targeting. Svensson's (2005) footnote 8 muddies the waters by focusing on the discretion-vs.-commitment issue rather than the targeting-vs.-instrument rules issue that is at the heart of our debate.

(1960). The 1960 proposal included a list of reforms to be undertaken prior to implementing the rule, including the introduction of 100 percent reserve requirements on those commercial banks whose deposits were included in the proposed target aggregate. This reform would make the target identical to the monetary base—immediately making the *k*-percent rule an instrument rule.

More frequently, Friedman has set out a *k*-percent money growth proposal without suggesting the major overhaul of the financial system implied by a 100 percent reserve requirement. In that case, the definition of money targeted, if it includes commercial bank deposits, will not be subject to exact central bank control. Does this rule proposal correspond to a targeting rule? Clearly not. Consider the following specifics of the proposal as given by Friedman (1982, p.117):

> Set a target for several years ahead for a single aggregate—for example, M2 or the base…
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> Estimate the change over an extended period, say three to six months, in the Fed's holdings of securities that would be necessary to approximate the target path over that period. Divide that estimate by 13 or 26. Let the Fed purchase precisely that amount every week…
>
> Finally, announce in advance and in full detail the proposed schedule of purchases and stick to it.

Friedman's proposal here refers to targeting either "M2 or the base." The latter again corresponds simply to a constant-growth instrument rule for the base. In the case of M2 targeting, denoting the log of the money multiplier by $mu = \log(M2) - h$, with h the log of the monetary base, this rule is given by $\Delta h_t = (k/400) - 1.0$ $E_{t-1}\Delta mu_t$, that is, a simple instrument rule with an intercept term and one further argument, the expected change in the money multiplier.[3] Importantly, Friedman's proposal explicitly specifies the policy instrument (the monetary base) with

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[3] Note that Friedman (1982) explicitly disavows using period-*t* information in pursuing the monetary target. His proposal therefore cannot correspond to a targeting rule because an optimal-control approach to targeting M2 would utilize period-*t* information helpful in hitting the target. Friedman is clearly willing to forfeit possible extra precision in hitting the target in favor of making the target one that can be pursued by a fully predictable instrument rule for the monetary base.

which to pursue the target. A targeting rule, by contrast, generally does not explicitly refer to the policy instrument.

While we disagree with Svensson's characterization of Friedman's rule, his surrounding discussion does indicate that his perspective is coming closer to ours. Whereas Svensson once devoted considerable effort to arguing that "[i]nflation-targeting central banks should specify explicit loss functions…[including] a specific relative weight on output-gap stabilization" (Svensson, 2003b, p. 148), Svensson (2005) goes so far as to say that a "simple and robust monetary policy rule is indeed an attractive idea," especially if the central bank "does not trust its information about…the output gap" and in light of uncertainty about "the true model of the transmission mechanism of monetary policy." These are, of course, long-standing arguments of those who argue for instrument rules. A targeting rule is hardly an ideal way of treating these problems. The lack of information about the output gap that Svensson acknowledges would make it hard for central bank committee members to settle on a way of estimating the gap, let alone follow the Svensson (2003b) proposal of announcing a welfare function with an explicit output gap weight. Proceeding with such an announcement in the face of uncertainty about the output gap would hardly be the way to create a "robust" rule and so would be unattractive by Svensson's own standard. As we emphasized in McCallum and Nelson (2005), the more general dilemma for targeting rules is that they are especially vulnerable to robustness problems because of their model dependency. Levin and Williams's (2003) results graphically depict the bloodbath that can result from imposing targeting rules derived from one model specification on models that come from other areas of the specification space.

VOLATILITY ANALYSIS

Let us now consider Svensson's discussion of our analytical contribution concerning interest rate variability. We are, of course, quite pleased that he acknowledges that our claims regarding volatility are correct, under the information

assumptions utilized in Svensson (2003a) and Svensson and Woodford (2005). We had been under the impression that these assumptions reflected careful consideration, as is typically the case in the work of both Svensson and Woodford. But now Lars goes on to propose new assumptions as representing "realistic" information conditions. We find the particulars of his specification to be unclear—e.g., concerning "early" versus "late" in a given time period and especially the notion that the central bank would "observe" its own error; so, rather than attempting a new discussion, let us state our position regarding information assumptions that we believe to be appropriate for monetary policy analysis. In previous work (e.g., McCallum and Nelson, 2004), we have suggested that, when setting i_t (the one-period instrument interest rate in period t), the central bank does not know the values of π_t or x_t (the inflation rate and output gap, respectively, during period t). Let us now provisionally agree with Svensson that private agents also do not know π_t or x_t when making decisions in period t. But they *do* know i_t, for financial market prices are observable day by day (or hour by hour), so i_t rather than $E_{t-1}i_t$ appears in equation (7). Then, under the assumption of rational expectations and with common information sets—*except that* private agents do not know e_{t-1}, the central bank error made in setting i_t—private agents will be able to infer e_{t-1} from the central bank's policy rule together with the specification of the economy using equation (12) or (15). Therefore, expectations formed in period t of any variable for period t or the future will be the same for the central bank and private agents. The foregoing is, however, equivalent to the assumption used in our paper (as well as in Svensson, 2003a, and Svensson and Woodford, 2005). So the analysis as presented in our Section 6 seems to be realistically appropriate, as well as consistent with the two just-cited papers.

In the section of his comment that discusses volatility, Svensson also presents five claims ("first," "second," etc.) that are logically irrelevant to the discussion—*of course* his equation (9) is an approximation to (8)!—except for the fourth item. This one is basically incorrect, however, because to implement Svensson's (8) requires use of his (5); the function of (9) in this context is to constitute one way of implementing (8).

CONCLUSION

In conclusion, we note that on p. 621 Svensson warns as follows: "Central bankers, beware of McCallum and Nelson's instrument rule!" But the rule he is referring to—with a very large value of μ_1—is one that we say (explicitly) that we have *not* recommended (please see our discussion on p. 603). It was used in our 2004 paper as an implementation device; in our current paper, it serves to illustrate our analytical claim, namely, that our instrument rule (actually, class of rules) is usually superior in performance, with respect to Lars's own criterion, to the targeting rule that it approximates.

Finally we turn to Svensson's featured question: "What is wrong with McCallum and Nelson?" In terms of personal characteristics, we would admit to a multitude of flaws, weaknesses, and fundamental defects. In terms of the arguments of our paper, however, we believe that the correct answer is: "Nothing."

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