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Edward J. Green

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Comment on PAYMENTS SYSTEMS WITH RANDOM MATCHING AND PRIVATE INFORMATION, *by Edward J. Green*

Stephen Williamson's paper contributes in two ways to the program of this conference. First, it concerns the relationship of financial intermediation to the role of money and to monetary policy. There is a definite need for models that can illuminate this relationship, as recent concern within the Federal Reserve, regarding the possible complications that introduction of sweep accounts might have for the conduct of open-market operations, makes clear. Williamson's model lacks the institutional detail needed to address that issue or others of such a concrete nature directly, but it is a valuable effort to provide a foundation on which models with richer institutional detail might be built.

The other respect in which this paper makes a particular contribution to the conference program is that Williamson adopts a complementary modeling strategy to the one adopted in most of the other theoretical papers in this volume. In those other papers, models are specified in ways that include exogenous restrictions on the forms of contract that agents can make with one another. In contrast, Williamson derives the form of contract that agents adopt as the solution to a cooperative optimization problem that the agents jointly solve.

This contrast in modeling strategies is analogous to the distinction that physicists draw between phenomenological laws and fundamental laws.[1] A phenomenal law is an ad hoc description of a type of event, but one that is designed to be as factually accurate as is conveniently possible. For example, an equation with a parameter for friction might be adopted as a phenomenological law describing how an object moving on a level surface will decelerate. This friction parameter may be set at one value for a ball on a billiard table, another value for an automobile in neutral gear on a parking lot, and so forth. In contrast, one of Newton's laws of motion states that an object will continue moving in a straight-line direction and at a constant speed forever.

Rather than debating the relative merits of these two modeling strategies as though

The views expressed here are solely those of Mr. Green, and do not necessarily reflect official views of the Federal Reserve Bank of Minneapolis or of the Federal Reserve System.

1. My discussion of these two types of law in physics draws on *How the Laws of Physics Lie,* by Nancy Cartwright. New York: Oxford University Press, 1983.

EDWARD J. GREEN *is with the Federal Reserve Bank of Minneapolis.*

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only one of them can be adopted, economists should recognize that—just as in physics—the models resulting from each strategy have appropriate uses. Whether in physics or in economics, phenomenological laws are invaluable for yielding precise, quantitative predictions about situations that differ from previously observed ones only in specific, well-understood, and controlled respects (such as, in physics, the force with which a particular billiard ball will be struck by the cue). However, fundamental laws are more appropriate than phenomenological laws for some other uses. One such purpose, specific to economics, is welfare analysis. If a particular type of contract is specified exogenously to be used, and if some government policy can ameliorate an inefficiency of that contract but will itself conflict with efficiency in some way, then one cannot seriously recommend the policy on the basis of that model. If the contract being studied is used simply because an alternative type of contract is legally prohibited, then the right policy advice may be to repeal the prohibition rather than to treat it as being immutable and try to compensate for it. Even if repealing the prohibition is not the appropriate recommendation, a phenomenological model may suggest a bad recommendation that would be avoided if the reason why the type of contract is actually used were modeled. For example, if one specifies exogenously that private agents cannot make insurance contracts with one another, then government provision of insurance may superficially seem to be a good policy. However, if agents actually do not make insurance contracts with one another because a moral-hazard problem leads insured agents secretly to do things that are insanely risky, then government-provided insurance is likely to elicit that same risky behavior, and thus it may possibly make everyone in the economy worse off. Within limits that I will discuss below, one can be much more confident of the appropriateness of a policy recommendation that is derived from a model in which agents' choice of the type of contract, the effect of which is to be ameliorated, is itself derived from plausible features of the actual environment that the model incorporates.

Appropriately, then, Williamson emphasizes welfare analysis in his paper. He derives two main conclusions from his model. One is that the Friedman rule (that is, equating the real rate of return from holding money to the marginal rate of intertemporal transformation in the economy) is optimal. This is, of course, a recommendation that can already be derived from a number of antecedent models. Does Williamson's derivation strengthen the case for it? I think that it does not, or at least, not by very much. The Friedman rule not only establishes a variable that monetary policy should be aimed at affecting (that is, the real rate of return on holding money), but also it sets a precise, quantitative target value of that variable that policy is supposed to achieve. It is plausible to me that, while understanding the logic that leads to recommending the Friedman rule is of great value for thinking about monetary policy, nevertheless there are some features of the actual economy that obviously ought to be taken into account by monetary policymakers but that are ignored in Williamson's highly schematic model. Indeed, ignoring such things is practically the essence of Williamson's model, since the strategy of formulating a fundamental model is to simplify it as far as possible so that the logic of its analysis will be perfectly clear. Thus, while seeing how this model economy operates under a Friedman's-rule regime may

help to understand the model as a whole, I would not regard the derivation of Friedman's rule as being a main contribution of the paper.

In contrast, the other main implication of the model—that an economy with well-developed institutions of financial intermediation is likely to be more robust to deviations of monetary policy from optimum—is the type of implication that I would expect a fundamental model to yield, and it is an idea that merits serious study. The result could be sharpened by reformulating the model to take into account the fact that financial intermediation does not entirely dispense with the need for money. In actual economies, payments settle by transfers of base money (specifically, in transfers of bank reserves). It would be more accurate to specify that financial intermediation economizes on the use of money by facilitating net settlement, than to specify (as Williamson does) that intermediation is a completely nonmonetary way to make trades. Except for a few large-value payments systems, net settlement typically reduces the need to use base money by a factor of two or three. That seems to be a sufficiently large factor that Williamson's logic should be pertinent, but it is also a sufficiently small factor that the quantitative implications of his model in its present form would be exaggerated.

In providing a logically transparent (albeit schematic) derivation of a new idea that undoubtedly will be further studied, though, Williamson's model does what one would expect from a successful fundamental model in the field of monetary theory.