REPLY (*)

Professor Amedeo Gambino in his comment "On the Endogeneity of the Money Stock" raises several questions about the sharp distinction that I draw between the nominal money stock and the real money stock in "Some Issues in Monetary Economics" (1). In this article, I treat the nominal money stock as an exogeneous variable — in the sense that it may serve as a target variable and policy instrument — and contrast it with the real money stock which I treat as an endogenous variable with an equilibrium solution determined by the interaction of the financial and real sectors and outside the direct control of the monetary authorities. Professor Gambino argues in his note for the following points: (1) that portfolio decisions by the public do affect the nominal money stock and it should also be viewed as an endogenous variable; (2) that I limit the public's impact on the nominal money stock to a marginal influence partly because I stress only the factors affecting the *composition* of liquid assets and ignore those that determine the *size* of the public's portfolio; (3) that the sharp distinction that I draw between the nominal money stock and the real value of the stock tends to disappear if we take account of the preferences affecting both the *size* and the *composition* of liquid assets holdings. But while Professor Gambino argues for treating the nominal money stock as an endogenous variable, he does not deny that the monetary authorities "control" or "govern" the amount outstanding.

I can attempt to answer the points raised in Professor Gambino's comment by assuming that he is questioning primarily my classification of the nominal money stock as an exogenous variable. My criterion is that it can be controlled by the authorities and serve as a target variable, and this classification does deemphasize the influence of portfolio decisions by the public. Professor Gambino, on the other hand, wishes to highlight the role of the public and treat the nominal money stock as an endogenous variable, while conceding that it may be controlled by the central bank. But the

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(1) See DAVID I. FAND, "Some Issues in Monetary Economics", this *Review*, September 1969, pp. 215-248.

distinction that is crucial for my paper is not whether a variable is classified as exogenous or endogenous, but whether, in fact, it is a *controllable* or a *non-controllable* variable. Consequently, if I accept Professor Gambino's argument and classify the nominal money stock as endogenous, I would then need to distinguish between *controllable* endogenous variables and *non-controllable* endogenous variables that are outside the reach of the central bank.

Although Professor Gambino's note may be interpreted as centering primarily on the criteria that I use in classifying variables as exogenous or endogenous, I do believe that there is a more important substantive issue that he is seeking to emphasize. Professor Gambino may be interpreted as saying (1) that the channels through which the public, in its portfolio decisions, influences the amount of nominal money outstanding may differ from the channels through which they influence the real value of the money stock and (2) that because of this difference in *form* we may be oblivious to the important similarity concerning the *substance* of endogeneity. As he sees it, both cases are substantively quite similar; and he therefore believes that it is more appropriate to classify both the nominal and the real money stock as endogenous variables being essentially determined by the public, though possibly through different channels. I believe that this interpretation may come closer to what he has in mind, and I shall therefore attempt to analyze this issue.

The stock of nominal money outstanding at any moment in time clearly depends on the public's preference with respect to its holdings of financial assets, and this notion is explicitly incorporated in the money supply functions that I described in my article. Moreover, the functional dependence of the money supply on the public's preference may derive from the factors affecting portfolio composition as I suggest, or it may also reflect the factors that influence the total volume of liquid assets held by the public. But the form that this dependence takes is not by itself sufficient to help us in classifying the nominal money stock. To answer this question we require a principle, or a set of criteria, to classify variables. Let me therefore illustrate the kind of criteria that we might employ.

Consider first a set of variables such as reserve requirements, the discount rate, or unborrowed reserves which do not have a determinate equilibrium solution, and where the central bank has considerable latitude in adjusting these variables as policy instruments. Contrast these with a second set of variables such as the real money

stock or the real wage which have a unique solution and, in equilibrium, are clearly outside the reach of the central bank. The nominal money stock is a variable somewhere between these two polar cases: it clearly does not possess a unique and determinate equilibrium solution such as the real wage; but, at the same time, it may not be so completely within the control of the central bank so that it is for all practical purposes indistinguishable from instrument variables such as unborrowed reserves, discount rates, or reserve requirements — at least in the very short run.

The exogenous-endogenous classification used in my paper hinges on whether or not the variable can be controlled by the authorities. Accordingly, on this basis, the nominal money stock is, in a spectrum of variables, much closer to an instrument variable such as the discount rate. This is not to deny (1) that desired changes by the public — with respect to the composition or the total volume of liquid assets — must be taken into account explicitly, (2) that we must pay attention to such feedbacks if the authorities seek to achieve a given money stock target, and (3) that such feedback effects may be more pronounced for the money stock than is the case with setting a discount rate. Professor Gambino does not accept this criterion, and argues that the cutting edge for the exogenous-endogenous classification is whether or not the public has a significant role in determining the amount outstanding; and he concludes, on this basis, that both the nominal and the real money stock are endogenous variables.

My classification therefore includes the nominal money stock, a variable where the feedback effects may be significant, with instrument variables where the feedback effects may be less significant; Professor Gambino, on the other hand, includes the money stock, a variable that can be "controlled" or "governed" by the authorities, with endogenous variables which cannot be controlled by the authorities. Thus, even if we accept Professor Gambino's classification and classify both nominal and real money as endogenous variables, we still need a further classification to distinguish between *controllable* and *non-controllable* endogenous variables. And while there are many other alternative criteria and classifications that one could justify for particular problems, the distinction that is crucial for my analysis is between *controllable* and *non-controllable* variables.

The emphasis in my article on the extent to which a variable is controllable by the authorities may be rationalized as follows: let us

consider variables such as the real wage or the long term rate of growth which we do not think of ordinarily as being easily, or readily, influenced by legislation, or as necessarily subject to policy decisions. Contrast these with other variables such as the money wage, the price level, or the level of money income which are not uniquely determined and do require some kind of a policy decision. The first set of variables may be said to have a relatively unique equilibrium and differs in this respect from the second set of variables which do not have a determinate solution and therefore require a policy decision. In my article, I restrict the class of endogenous variables to those variables which have a determinate equilibrium solution; they not only do not require an independent policy decision, but would be possibly overdetermined and/or inconsistent in the presence of such a decision. On this basis I include the nominal money stock as an exogenous variable — or policy variable — since it can be made to serve as a target variable and since it is not determined with a unique equilibrium but does require an independent policy decision. Professor Gambino is clearly under no obligation to define, or classify, exogenous and endogenous variables on this basis; but then he must find some other concept to distinguish between the *controllable* variables that require a policy decision and the *non-controllable* variables that are outside the control of the authorities.

There may be still another way to analyze Professor Gambino's comment. One may interpret his note as calling attention to the fact (1) that the nominal money stock cannot be *precisely* controlled, and (2) that it may therefore be difficult to implement a policy of guidelines for the monetary aggregates because portfolio decisions by the public exert an important, and perhaps decisive, influence in the short run. Put more precisely, monetary policy defined in terms of money stock growth rates may be difficult to implement because portfolio changes by the public may introduce a considerable amount of "noise" in the short run movements of the monetary aggregates. This may well be true. But, if so, we must go on to the next question and consider whether these feedback effects are sufficiently large, in the short run, to frustrate the monetary authorities. The short run "noise" problem would be clearly insurmountable, if we require the authorities to hit the targets on a daily or weekly basis. On the other hand, the quantitative significance of these feedback effects may be considerably lessened if we extend the period in which

the authorities have to achieve the target up to a quarter (2). If this is his point, I accept it. But this still leaves open the question of how to distinguish between variables that can be controlled by the policy makers as instruments or tools — even if the control is not very precise for short periods — from other variables that must be treated as having equilibrium solution values that cannot be influenced by the policy makers. It is this latter distinction that is crucial for my paper. And I can substitute *controllable* for exogenous and *non-controllable* for endogenous without changing the substance of my article. And this is especially clear in Section II on "The Income Theory and the Quantity", pp. 226-232, where the policy implications of this distinction are elaborated.

One final note. We tend to write about the classification of *controllable* and *non-controllable* variables as if it involved a dichotomous distribution; in actual fact this is not entirely an either/or characteristic of variables but one that should be placed in a continuous spectrum ranging from instrumental variables at one end to variables with determinate equilibrium solutions at the other end. Thus, no one would argue that an instrumental variable such as the discount rate is *completely* within the jurisdiction of the authorities and that the Federal Reserve could fix this rate at 1% in the United States in 1970. The consequences of doing so would be so overwhelming that no one would think of suggesting such an action. What we do mean when we call discount rate an instrumental variable is that it is near one end of the distribution where the authorities have a fair amount of latitude in determining what the rate is, and that it does require some kind of policy decision by the authorities. It is in this sense that we consider the nominal money stock as a policy variable that has significant instrumental properties.

And this is not, I believe, just semantics. Professor Gambino is saying that the policy bottle is three-quarters empty, while I argue that it is three-quarters full.

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(2) See *Controlling Monetary Aggregates*, Proceedings of a Monetary Conference Federal Reserve Bank of Boston, 1969.