

## DISCUSSION

HYMAN P. MINSKY\*: I am not a specialist in the enterprise, or game, of building large-scale econometric models. To anyone in my position the visible output from such a project is not very revealing. The power and presumed majesty of the techniques are not readily apparent from what is made public in the paper at hand. The fact that past efforts to build large-scale models have not been particularly successful permits us to be skeptical about new endeavors, no matter how plausible the claims of their builders may be.

A common discussant's "ploy" is to take authors to task for not having written a different paper, and to ignore what they have written. I am going to adopt a parallel gambit and describe attributes of a model that should be built. This gambit is legitimate because although the title of the paper is "The Channels of Monetary Policy," the underlying model contains a most primitive set of financial instruments and linkages.

Most existing econometric models are flawed as they are based upon an assumption that the economy always functions in one way. But increasingly the evidence indicates that money and financial variables do not affect the behavior of the system in the same way at all times. Thus the fundamental problem is to build a model which allows for different modes of behavior and in which the transitions among modes are functions of endogenous economic variables. Inasmuch as the evidence indicates quite strongly that financial crises and disturbances are the triggers for deep depressions, a truly useful model would have such events endogenously determined.

There is a simple, straightforward, very naive approach to large-scale model building. This takes the form of constructing an expanded multi-dimensional multiplier. The basic Klein-Michigan-Suits model is an example of the genre. For forecasting purposes investment is almost always treated as exogenously determined (i.e. survey data are used) and a very modest monetary and financial sector is introduced.

As the slogan "money matters" has gained in popularity, the enterprising builders of complex models have responded by putting monetary bright work onto their product. In the F.R.B.-M.I.T. model, at its present state of development, three monetary channels are recognized: the cost of capital, a wealth effect and credit rationing. In spite of the claim to greater sophistication with regard to money and finance, financial institutions as such are not introduced and problems arising from the existence of outstanding stocks of financial assets are not faced. *and liabilities fully*

The recent past has included crunches, Federal Reserve behavior constrained by the need to sustain the integrity of financial institutions and threats of crunches. A model that is to explain how monetary factors operate within the American economy must be capable of generating crunches and threats of crunches and to allow for the insolvency of liquid financial institutions. In order to do this, attention must be focused upon the stock of financial instruments outstanding and the cash flow generated by these stocks. In particular, financial layering and the portfolio behavior of financial institutions must be introduced.

The investment model is naive—at least it is not an investment model for an intensely financial capitalist economy. In the model the "cost of capital" in the price of the capital good sense and the "cost of capital" in the rent sense determine the optimum capital stock. The orders for capital are a complex weighted average of past

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backlog. No allowance is made for how investment and positions in the stock of capital are financed.

The beginning of sense in the analysis of investment in a capitalist economy is to start with the firm, the basic investing unit, and to analyze how cash receipts from operations are committed by the existing liability structures. A decision to invest is always a decision to emit liabilities (explicit or implicit) or sell off some assets to finance the acquisition. It always modifies cash flow commitments as well as future control over cash flows by means of transactions in assets. For an ongoing organization, investment decisions are not independent of the inherited liability structure. One channel linking monetary phenomena and real investment is the terms upon which positions in the stock of capital can be refinanced. A rise in financing <sup>costs</sup> ~~terms~~ increases the cash flow committed as positions are refinanced and thus will tend to decrease investment by a channel other than the cost of financing the investment.

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In examining investment behavior it is necessary to remember that from time-to-time the capital development of a capitalist economy "becomes the by-product of the activities of a casino." A straightforward price of stock—price of flow investment model, where the price of the stock is proxied by stock market variables, seems most relevant at these times for a large and volatile part of total investment. Stock market variables in turn are determined by business cash flows net of costs and gross financial commitments, the rate of change of this variable, and its variance. This investment model takes the liability structure of firms into account. Stock market reaction to rising interest rates centers around the greater cash flow commitments as positions are refinanced at higher rates. Such a view of investment centering around financial flows should be capable of capturing accelerating investment such as occurred in the mid-1960's and the break in the growth of investment such as occurred in mid-year 1966.

In the paper at hand a dummy variable "for the 1962 crisis of confidence" plus a downward time trend are introduced in the equation for the dividend price ratio of common stocks. These crises and trends are what require explanation if the models are to be more than assertions about the great deal of inertia in the economy.

At any time the financial institution—banks, life insurance companies, savings and loan companies, etc., as well as households and other ultimate units must own the outstanding stock of financial instruments. This stock is the legacy of past investment activity, transactions in tangible assets and layerings of financial positions. These positions as well as positions in the financial assets created as a result of ongoing investment need to be financed.

The stock of assets, real and financial, set up cash flows to units and the stock of liabilities set up cash flows from units. Deficits in cash flows, when they arise, are handled by sale of asset or the emission of liabilities. The obvious lesson from the crunch of 1966 is that if there is a serious need for units to make position by selling assets, the price of assets can fall quickly—and that such events occur. For a model to catch these crises, which the F.R.B.-M.I.T. model handles by ex-post shift parameters, before they occur it is necessary to explicitly analyze position-making and refinancing.

Credit rationing is taken to reflect shortfalls of net cash flows to savings intermediaries relative to "normal" cash flows. It is assumed that such changes in flows are reactions to interest rate patterns. However, rising interest rates on assets impair the capital of financial institutions and the associated increase in uncertainty tends to generate a short run desire for increased liquidity by financial intermediaries which

The terms on new issues can rise relative to the terms on outstanding issues; in over-the-counter markets the differential between bid and asked price can vary. Rising interest rates introduce a reluctance of underwriters to take position and thus sharply increase the cost of new money. Without introducing a new issues market the impact of what De Leeuw and Gramlich choose to call credit rationing upon other than housing cannot be captured.

There are two sets of numbers which should be useful in constructing models that catch how the accumulation of financial interrelations affect system behavior. One is the integrated set of balance sheets contained in the Flow of Funds accounts. A transformation of these accounts from an emphasis upon how investment is financed to an emphasis upon the payments implicit in balance sheet relations seems in order.

The second is the vast body of numbers collected in the bank examination process. Presumably, if the right questions are asked and if the results are quickly processed information can be made available which will permit the estimation of the distribution as well as the total or average balance sheet and cash flow positions of banks. Financial crises result from the position of units at the extremes of the distribution rather than from changes in the average position.

To conclude, at present the American economy is intensely financial. When the American economy does well over an extended time period it is prone to generate a potential for financial booms and crises. At such times its rules of behavior differ from the rules that guided its behavior in more placid times—say the late 1930's or the early 1960's. In particular sharp impacts from monetary and financial variables to real variables will occur: the lags between monetary and real variables will be shorter in a situation such as that which rules at present than was true in the periods used in estimating the coefficients in the model. Thus the objective of the F.R.B.-M.I.T. model builders—to introduce monetary and financial variables into econometric analysis—is commendable. But because they added on a somewhat more complex set of financial variables to a model that in its basic format is not well designed to handle financial factors, they are not, as far as I can judge, successful in catching how money and financial variables affect the present day American economy. Given the objective, a more appropriate way of going about their task would be to first construct a financially oriented model of the entire economy; a model that would encompass crunches, booms and crises as well as more placid behavior.

In particular to the investment and capital holding process.