"Buffer-Stock" Money and the Transmission Mechanism

by David Laidler

Economist David Laidler discusses the buffer-stock approach to monetary economics and presents its cautionary implications for policy.

Though not unknown, the topic of this lecture is not fashionable in American economics. The "buffer-stock" approach to monetary economics has conventional enough foundations, but it takes a couple of particular turns that differentiate it both from modern new-Classical macroeconomics and the more traditional Keynesian alternative. In each case, however, the turn in question seems to me to be an empirically fruitful one. It would not be appropriate to turn this lecture into an exercise in abstract model building, and I shall not therefore try to establish by rigorous argument the logical coherence of the conclusions I shall discuss. Rather I shall sketch an overview of the buffer-stock approach as I see it, indicating where it is identical to conventional theorizing and where it differs. I shall pay particular attention to issues that are empirically interesting and relevant to policy when viewed from the buffer-stock perspective. In short, though I shall not attempt to prove to you that this approach is correct, I shall try to persuade you that it is worth serious attention.

Having claimed empirical content for the approach, my first step in setting it out must be to draw attention to a question that it does not answer. The approach has nothing to say about why that complex of social institutions which we call the monetary system exists. It begins, not by explaining them, but by describing them. No doubt this is a deficiency, but we do have to start somewhere with our economic theorizing. Economists have no qualms about taking the existence of such institutions as property rights, law, and government for granted when they begin their work, and the monetary system is surely an institution on the same level as these. It would be nice to be able to explain its existence, but our inability to do so should not prevent us from addressing more tractable problems. Hence, though I note that the buffer-stock approach does not deal with these issues, I see no reason to apologize for this failing.

The buffer-stock approach, then, begins with the observation that, in the world we inhabit, economic activity is coordinated by monetary exchange among agents—consumers, producers, workers, employers, savers, and investors—separated over space and time. Though
we continually speak of the United States as a "market economy," we argue by analogy when we do so. To an economic theorist, a market is a place where agents come together to trade with one another, a place where each one of them can obtain complete and accurate information about the prices of all the goods and services that interest them before making any commitments as to production or consumption plans, and also a place in which the actual exchange of inputs and outputs can be carried out costlessly. When we describe the United States as a "market economy," what we are saying is that the outcome of the monetary coordination process for economic activity is similar to that which would be achieved in a market such as I have just sketched out.

Of course, radical critics of modern economic theory often reject this analogy outright, but I do not wish to be counted among them. The laws of supply and demand do seem to have considerable explanatory power over the world we live in, and it is hard to believe that they would have that power if it were not valid to argue that actual economies behaved to a considerable extent "as if" they were coordinated by markets. Nevertheless, if monetary institutions are alternatives to markets, we should be particularly wary of arguments by analogy with a world in which monetary institutions do not exist when we come to study the monetary system itself. What I specifically mean by this will, I hope, become clear as this lecture proceeds.

The Demand for Money

Consider a typical agent carrying on economic activity in a world characterized by monetary exchange. If this agent is a household, it will supply various productive services to firms, obtain income from these transactions, and use that income to obtain goods and services to consume. The transactions here will not, of course, be by barter. Income is paid out in money, and goods are bought with it. Furthermore, because the timing and amount of both income and expenditures is never quite certain, it will pay this typical household to keep on hand a certain stock of money to tide it over unexpected discrepancies between the two flows. A buffer stock of money enables plans about expenditures to be insulated (to a degree) from surprises about receipts and enables spur-of-the-moment decisions to be made about expenditures even when the timing of receipts would not permit such expenditures. Nor is this line of argument confined to the household. Firms cannot plan their sales and purchases precisely either as to timing or amount, and also find a buffer stock of money indispensable to their smooth functioning. This is not to say that money is the only means available of coping with such problems. Readily available lines of credit, not to mention stocks of other liquid assets, and indeed inventories of goods, can and do also function as buffers. However, the analysis that follows requires not that money is the only buffer stock in the economy, but only that it is an important one.

There is of course nothing new here. All I have done is briefly state the basis of modern approaches to the "transactions/precautionary" demand for money. I have said no more than that in a world in which the timing and amount of payments and receipts is less than certain, agents will find it convenient to hold some of their wealth in the form of money balances. They will do so because holding money enables...
them to mitigate the consequences of uncertainty for their ability to carry out their plans. In a true market economy, where all could make arrangements to deal in pre-planned amounts at known prices for everything that concerned them, there would be no need for money, because there would be no uncertainty about payments and receipts. These would be fully coordinated in advance before production and consumption were undertaken. Though this argument too is commonplace, when we put it together with a third idea, also uncontroversial among economists, and bring it to bear on theorizing about money, the buffer-stock approach begins to take a turn that differentiates it from more conventional treatments of monetary issues.

The third idea in question is that in a world in which agents are not presented gratis with all the information they need to make their plans, information itself is an economic good. We should therefore think of agents as being able to gain knowledge by devoting time and trouble to its acquisition, and we should also think of them as doing so up to the point at which the subjectively perceived marginal value to them of acquiring more of it is just counterbalanced by the marginal costs involved in that acquisition. Specifically, we should think of households and firms as being able to reduce the amount of uncertainty they face about their future patterns of payments and receipts by devoting resources to investigating the factors upon which they depend. But, of course, the benefits to be obtained from such research will come in the form of reduced costs arising from the unexpected disruption of plans. We have already seen that holding buffer stocks of money is also a means of reducing such disruption. Hence we must conclude that to devote wealth to money holding is, for the individual agent, an alternative to devoting it to the production of information.\(^3\)

The implications of this argument are of profound importance for the study of macroeconomics. The last decade or so has seen this branch of our discipline subjected to the so-called "new-Classical Revolution," whose very essence has been to argue that macroeconomic problems must be analyzed using economic models in which agents are always in equilibrium in the sense of being able to execute their plans, and in which those agents base their plans upon all economically available information. When they are put this way, the buffer-stock advocate can have no quarrel with new-Classical prescriptions for the construction of economic models. However, the actual way in which the pioneers of this approach have translated their principles into practice is a different matter, for they interpret them in a very special way. Moreover, it is the special nature of the interpretation in question which gives new-Classical economics its particular character.

The new-Classical models of, for example, Robert E. Lucas (1972), Thomas Sargent and Neil Wallace (1976), or Robert J. Barro (1978), to cite three key contributions to this body of thought, assume not only that all agents execute their plans, but that these plans are coordinated by a set of market-clearing competitive prices at which all trade takes place. Furthermore, agents' access to information is such that though they are deprived of knowledge of the prices of the goods they plan to purchase at the times at which they consummate their sales, they nevertheless know enough about the processes determining those prices to ensure that their receipts from sales are just sufficient to enable them to make the market-clearing volume of purchases when the moment comes for them to buy. They know all this despite the fact that they do make errors in forecasting buying prices. In effect, in these models, information is assumed either to be available to agents at zero marginal cost (in which case they use it in the formation of expectations, which also impose zero marginal computational costs upon them) or else to be completely unavailable.\(^4\)

It should be apparent from the earlier discussion that, in the buffer-stock approach, the gathering and processing of information are thought of as being subject to rising marginal cost, and that, for the individual agent, money holding is viewed as a substitute for devoting resources to such activities. Thus, in a monetary economy, "all economically available" information is unambiguously less than "all available" information. Furthermore, if the agent we are considering is a firm, it needs information for activities such as setting the price of output, making wage offers to employees, and so on. Since money holding mitigates the consequences of making mistakes here, we should expect money wages and prices to be set on the basis of less than "all available" information and, hence, sometimes to take values that fail to equate supply and demand. Since it is costly to vary prices, and since money holding mitigates the costs of trading at prices that represent unequal current supply and demand, we might also expect money holding by firms to be associated with less frequent variations in
prices than in a market of costlessly variable prices arrived at "as if" at the will of a Walrasian auctioneer.\(^5\)

In short, to use economists' jargon, the buffer-stock approach to monetary economics argues that the twin assumptions of "clearing markets" and "rational expectations" (as the latter are currently implemented in new-Classical economics) are inappropriate bases for dealing with macroeconomic issues. It does so because the interaction between market uncertainty and money holding runs in both directions. Uncertainty causes agents to hold money, but the very fact that doing so protects them from its consequences also helps to ensure that the uncertainty in question persists. The first argument is quite standard, but the second less so. Even so, the first argument, refined along well-known lines, leads to quite conventional conclusions about agents' demand for money being a demand for so-called "real balances," that is, money measured in units of constant purchasing power. The amount of protection that a given amount of nominal money will provide against uncertainty about future fluctuations in real conditions of supply and demand will vary in direct proportion to the average price level at which transactions are carried out. If that price level changes by a certain amount, then the typical agent will have to make an equiproportional adjustment in his money holdings in order to obtain the same degree of insulation against unexpected shocks as he had before.

In saying that the demand for money is a demand for "real balances," the buffer-stock approach is saying nothing which differentiates it from other approaches to modelling the demand-for-money function; nor is there any novelty in anything else that it says about the nature of the demand for money per se. The individual agent might be expected to make do with smaller real balances on average as the cost of holding them (as measured by some nominal interest rate) increases. He might also be expected to hold more of them as his real wealth increases, and this for two reasons. Not only does an increase in wealth mean that the agent has more resources available for asset holding in general, so that some of them might be expected to be devoted to money in any event, but as an agent's wealth increases, so might the scale of his market transactions. If exposure to uncertainty about the volume of payments and receipts increases with the scale of market transactions, then the amount of work that an agent will require his money holdings to perform will also increase.

Thus, when the price level, the interest rate, or his wealth varies, the typical agent will want to eliminate the discrepancy to which this gives rise between his actual and desired money holdings. He can make that adjustment only by temporarily altering his rate of flow of expenditure on goods, services, and assets other than money. A firm or a household seeking to build up a cash balance to a higher desired level will cut down its purchases and attempt to increase its sales and vice versa; the particular items that will be subjected to variations in their supply and demand here will, of course, vary from agent to agent, but the same simple principle will be at work in each case. In short, for the individual agent, a discrepancy between actual and desired money holdings will set up a real-balance effect on expenditure flows, both on currently produced goods and services, and also on the acquisition of other assets. However, since it is

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the essence of a buffer stock of money that it be allowed to vary over time about some planned average value as it absorbs unexpected shocks, responses here will not be rapid. The typical agent will make a conscious effort to adjust his money holdings by changing his market activities only when those holdings persistently take an average-over-time value that is "too high" or "too low."\(^6\)

The Transmission Mechanism

Economists study the demand for any item in order to be able to make predictions about changes in its supply. In the case of money, this does indeed mean that the purpose of studying
the demand for money, which was the subject of
the previous section of this lecture, is to enable
us to discuss the consequences of changes in
the supply of money. Without a theory of the
demand for money, one cannot discuss mon-
etary policy in a coherent fashion, and a good
criterion by which to judge any approach to
theorizing about the demand for money (though
not the only one, of course) is how helpful it is in
throwing light on policy issues. The questions
that arise in this context fall into two categories.
Some of them concern the ultimate effects of
changes in the quantity of money, and some con-
cern the processes whereby those ultimate
effects are brought about; they concern, if you
like, the equilibrium consequences of monetary
policy and the transmission mechanism where-
by the economy moves towards its final equi-
librium.

Now knowledge about the demand for money
is necessary to enable us to make predictions
about the effects of monetary policy, but it is not

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sufficient. There is not space here to discuss the
whole of macroeconomic theory, and I hope that
a few brief assertions will suffice to put what I
have to say about buffer-stock money into a
broader macroeconomic context. It is my judg-
ment that, over the long run, the levels of real
income and employment in the economy are
determined largely independently of monetary
policy, and that, in the wake of monetary distur-
bances, the economy will tend to return to
values of these variables given by supply-side
factors. Similarly, I would argue that the real rate
of return on capital in the economy is supply-
side determined, and that the nominal interest
rate varies with this real rate of return, suitably
adjusted for the expected inflation rate. These
are very "monetarist" judgments that not every-
one will share; so let me add immediately that,
although in the following discussion I will argue
"as if" they were correct, much of what I have to
say about the buffer-stock approach to money
retains its validity in the context of other ways of
looking at macroeconomic phenomena.

Be that as it may, these assertions imply,
crucially, that everything upon which the de-
mand for money depends, except the general
price level, is determined independently of the
behavior of the money supply in the long run.
Hence, only the price level is ultimately free to
vary in order to return the supply and demand
for money to equilibrium after a change in the
quantity of money. Moreover, since the demand
for nominal money is proportional to the gen-
eral level of prices, a given change in the level of
the money supply will cause an equipro-
portional change in the price level. Also, in the
presence of an ongoing rate of monetary expansion,
prices will rise at the same rate (minus an
allowance for the effects of ongoing real growth
on the demand for money); hence a given
change in the monetary expansion rate will
change the inflation rate by an equal amount.

These, however, are the ultimate effects of mon-
etary policy, and what I have said about them is
neither new nor very controversial; but how are
they brought about? I would claim that it is here
that the buffer-stock approach has something
useful to tell us.

To understand the contribution that the
buffer-stock idea makes to the analysis of the
transmission mechanism, it is helpful to con-
trast its implications with those of other ap-
proaches to macroeconomics. Consider first the
"new-Classical" macro model. As is well known,
new-Classical macroeconomics distinguishes
sharply between the effects of "anticipated"
and "unanticipated" changes in the money sup-
ply. The former are said to affect only the
general price level, taking it immediately to its
new, long-run equilibrium value. The latter
affect both prices and quantities because, it is
argued, agents operating in particular segments
of the economy, seeing the money prices of what
they have to sell varying, mistake these changes
for relative price changes and respond to them.
Once such confusion is removed, so are the
quantity effects (except to the extent that er-
roneous investment decisions have been made
in the past in response to price confusions and
distort the economy's current capacity to pro-
duce goods and services relative to what it
otherwise would have been).

On the matter of how the effects of monetary
changes on the price level are brought about,
new-Classical macroeconomics is totally silent.
Prices move to keep markets in equilibrium at all times, we are told, but who moves them, and how they know what values to move them to, remains a mystery. Perhaps in the case of anticipated changes in the money supply, price-setting firms know enough about the structure of the economy that they immediately and costlessly calculate the changes that they must make to their own prices in order to do their part to maintain equilibrium between the supply and demand for money in the aggregate economy. And perhaps in the case of unanticipated changes, each firm, though misinformed about the state of its own market (and hence undertaking an output response along with a price response) nevertheless knows enough about every other firm’s misinformation for the collective outcome of their pricing decisions to be a price level change which (making due allowance for the output change) still maintains equilibrium between the supply and demand for money. In either event, as far as new-Classical macroeconomics is concerned, the “transmission mechanism” linking monetary changes to the price level is an unanalyzed but purely psychological phenomenon operating in the minds of extraordinarily well-informed marketing executives.8

The root of this weakness in new-Classical economics is, of course, its insistence on modeling the consequences of monetary changes “as if” they took place in a market economy of the type briefly described at the beginning of this paper, in which there would be no role for money to play in the first place. The buffer-stock approach has more to say about the transmission mechanism, precisely because it takes note of the fact that price stickiness and imperfect information are inherent properties of an economy characterized by monetary exchange. In this respect it is similar, though not, as we shall see below, identical to traditional Keynesian macroeconomics. It observes that, in such an economy, the first manifestation of an increase in the money supply will be a preponderance of agents finding themselves, on average, with too much money on hand, and that their response to this state of affairs will be to increase their rate of flow of expenditures on goods, services, and other assets including financial assets. It further notes that, if the money supply of the economy they inhabit is exogenously set by monetary authorities, then what each individual thinks can be accomplished by such means, namely a reduction in his cash holdings, cannot be accomplished by all agents at the same time. At first, therefore, agents will pass excess money to one another like the proverbial “hot potato.”

Only as the expenditure flows thus set in motion cause changes in the variables upon which the demand for money depends will they be dampened down. Interest rates will be pushed down as agents try to acquire bonds with their excess cash, and output will increase, both as lower interest rates have their own effects on demand and as direct expenditure effects of excess money make themselves felt. In due course, increased demand for goods and services will put pressure on input markets, not least the market for labor, and money wages and prices will begin to rise. All of these effects will reduce excess money holdings, and the expenditure flows associated with them will be diminished. Ultimately prices (and money wages) will be high enough to absorb the increased money supply, interest rates and output will return to their long-run, supply-side-determined equilibrium values, and the mechanism just described will cease to operate.9

Now in contrasting this buffer-stock story about the transmission mechanism with its new-Classical counterpart, I do not mean to imply that the distinction between anticipated and unanticipated shocks to the monetary system is irrelevant to the former approach. On the contrary this distinction is one of the lasting contributions of new-Classical analysis to economics in general. The extent to which prices and interest rates, as opposed to levels of expenditure and output, will vary in response to an increase in the money supply (or to an increase in its rate of growth) will surely depend upon the extent to which those agents involved in the setting of goods and asset prices “anticipate” the change in question. However, because in new-Classical economics all prices are always free to vary, “anticipated” and “expected” policy changes are synonymous. The buffer-stock approach, stressing as it does the rationality of price stickiness in a monetary economy, forces its proponents to distinguish between anticipated and expected changes, and to take account of the fact that a price-setting agent must not only perceive and understand the consequences of a policy change (in which case it is “expected”) but must also be free to act upon that information before a policy change can be “anticipated.”

The implication of applying the “unanticipated-anticipated” distinction in the context of the buffer-stock approach, then, is not that a clearly announced and fully understood mon-
etary policy change will have no real effects. Rather, it is that the manner in which the effects of a policy change divide themselves up over time between real and nominal variables will depend upon the extent to which that change is understood to have taken place, and the extent to which contractual arrangements already in place permit agents to act upon new information. These conditions, however, are likely to vary from time to time and place to place; though the transmission mechanism of monetary policy can be described qualitatively along lines set out above, it is impossible to make any quantitative generalizations about its nature. The well-known proposition of Milton Friedman about the effects of monetary policy, namely that they are subject to "long and variable lags," thus follows naturally from the buffer-stock approach. Hence, the approach implies that monetary policy does have real effects, but immediately adds the qualification that the size and timing of these effects is sufficiently uncertain as to render it useless, indeed dangerous, as a stabilization device.

The Role of the Interest Rate

Now the account that I gave above of the transmission mechanism must have sounded very "Keynesian," stressing as it did the role of sticky prices in the economy, and yet the policy conclusion I have just stated is far from being "Keynesian," at least as that adjective is understood in North America. In fact, my analysis is not as inconsistent as it might appear at first sight, because there is one distinctly un-Keynesian characteristic to my description of the transmission mechanism. I likened money to the proverbial "hot potato" which no individual willingly holds, but which the economy as a whole must, and argued that newly injected money continues to influence expenditure flows until the price level moves sufficiently far to make agents willingly hold it. I have thus argued that the existence of a discrepancy between the quantity of money supplied and demanded is a critical and persistent feature of the transmission mechanism. An orthodox textbook Keynesian account of this mechanism has no more room for such a discrepancy than does a new-Classical model, though a Keynesian model rules out its existence by somewhat different means.

The key element here is the role played by the responsiveness of the demand for money to interest rates in maintaining equilibrium between the supply and demand for money in Keynesian economics. Financial markets are extremely flexible and quick to clear, and therefore (so it is argued) any incipient discrepancy between the quantity of money supplied or demanded must immediately move interest rates to values at which it is eliminated. Thereafter, the longer-term effects of a change in the quantity of money come about as a result of the private sector's response to the incentives to increase or lower spending implied by these new interest rates. As compared to a buffer-stock model, the Keynesian variant removes one important source of uncertainty about the detailed operation of the transmission mechanism; and in so doing it narrows the range of empirical questions that need to be asked about that mechanism to those involving the effects of interest rates on expenditure. Hence, a "Keynesian" can be more confident than a "buffer-stock" advocate of the possibility of learning enough about the quantitative nature of the transmission mechanism to deploy discretionary monetary policy usefully.

An argument to the effect that interest rates do not maintain perpetual equilibrium between the supply and demand for money is thus an essential component of the buffer-stock story about the transmission mechanism. It is important to grasp, therefore, that this argument does not depend in any way upon an implicit assumption that interest rates are a "sticky price" as that phrase is usually understood. What is at play here is a special case of a rather general proposition that arises from viewing money as a buffer stock, namely, that in a monetary economy, goods, services, and assets of all sorts are traded not directly against one another, but against money. Moreover, prices are stated in terms of money, and equilibrium emerges in a monetary economy as a result of price-setting agents in individual markets setting the money prices of whatever it is they deal in in order to maintain equality between the supply and demand for that specific item. This is true for every item traded in the economy except money.

Now, of course, for a monetary economy to be in equilibrium, the price level and the structure of nominal interest rates have to take appropriate values, but no one sets these variables with such an end in view. Dealers in goods and services are concerned to get the money prices of
individual items right, and dealers in financial assets, to get particular interest rates right, in the light of signals emanating from the particular markets in which they operate. Specifically, interest rates move in response to the supply and demand for credit, for what used to be called "loanable funds." This is not to say that the flow supply and demand for credit is independent of the existence or size of discrepancies between the stock supply and demand for money; nor is it to say that for the system as a whole to be in full equilibrium, the supply and demand for both money and credit do not have to be equal. It is, however, to say that, out of equilibrium, the rate of interest will move in response to an excess supply of money in the economy only to the extent that this affects the supply and demand for credit, and that there is no reason to expect this change to be such as to eliminate immediately the excess supply of money in question.

Having made this point, though, does it matter? A buffer-stock modeller and a Keynesian would both agree that an increase in the quantity of money lowers interest rates in the short run as a part of the transmission mechanism. Disagreement here seems only to concern the size of the effect. There is, however, a little more to it than that. The orthodox Keynesian model has the economy always "on" its demand-for-money function, so that all observed variations in the velocity of circulation, that is, in the rate at which money changes hands, should be explicable in terms of fluctuations in the variables (including interest rates) upon which the demand for money depends. Not so the buffer-stock model. Here, the economy's being "off" its demand-for-money function is central to the transmission mechanism, and, in addition to variations in the factors affecting the demand for money, variations in the quantity of money supplied can also affect the velocity of circulation. The implications of this last argument for empirical questions concerning the stability of the demand-for-money function, which is estimated using the quantity of money supplied to measure the quantity of money demanded, are as obvious as they are important.

Some Loose Ends

It should by now be apparent that the phrase "buffer-stock approach" is a label for a particular set of interrelated hypotheses about the way in which the macroeconomy functions in the short run, and in one lecture it is impossible to cover all aspects of so complicated a topic. Nevertheless, before concluding this discussion it is important to touch upon a couple of issues which undoubtedly complicate the application of the ideas set out above to any real world economy. These issues are familiar enough to anyone working in macroeconomics and may be expressed in two questions: "How exogenous is the money supply?" which is to say, to what extent is the money supply determined by external factors like the discount rate? and "How unique among the spectrum of assets is money?" I shall touch upon them in turn.

A sine qua non of the foregoing discussion is the proposition that, although the individual agent can get rid of excess money, the economy as a whole cannot, and a more formal presentation of my arguments would be conveniently cast in terms of a model in which the nominal money supply is an exogenous variable determined by external factors. The real world, it may be objected, is not like that; the quantity of money is in fact an endogenous variable determined by the actions and reactions of banks, businesses, and consumers. This is true, but it does not follow that buffer-stock analysis is irrelevant. That a variable is endogenous to the economic system does not also imply that it is completely passive. Whenever there exists some agent, say a central bank, which stands ready to buy and sell some other asset, say bonds or foreign exchange, in exchange for money at a fixed price, the equilibrium quantity of money will be demand-determined in full equilibrium. However, it does not follow from this that disturbances
to such an equilibrium cannot arise from fluctuations in the supply of money, or that discrepancies between the supply and demand for money will be costlessly eliminated by an immediate restoration of the money supply to its initial value.\textsuperscript{14}

Thus, under an interest rate-pegging regime, money created in connection with the funding of either a government deficit or the satisfying of the private sector's demand for bank credit will surely come into circulation and exert an influence on expenditure flows. Even when the interest rate is pegged, the private sector does not transact with the banking system with the conscious intention of varying its money holdings. People borrow from banks to buy goods and assets, not to obtain money to hold, but money is nevertheless created as a by-product of such activities. In a fixed-exchange-rate, open economy, a surplus in the balance of payments

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caused by, shall we say, an increased foreign price level will increase both the domestic money supply and price level and, according to the buffer-stock approach, will do so by way of mechanisms of the type described earlier. Furthermore, an increase in the money supply arising from the creation of domestic credit must ultimately be offset by an equal and opposite movement of foreign exchange reserves, but such an increase is quite capable of influencing domestic variables as part of the short-run mechanism that shifts the balance of payments. In short, endogeneity of the supply of money certainly changes our view of the nature of the equilibrium relation between money and other variables, and complicates any account that we might give of the transmission mechanism, but it does not eliminate all scope for buffer-stock effects.

The same may be said about the effects of recognizing the non-uniqueness of "money" as a "buffer-stock" asset.\textsuperscript{15} Of course other financial assets, not in and of themselves means of exchange, but readily and cheaply convertible into money, are held out of precautionary motives, and of course firms in particular hold inventories of all manner of inputs and outputs for similar reasons. The availability of such alternatives to money will presumably affect the equilibrium demand for it and indeed might make it possible to talk meaningfully of more than one monetary aggregate. Also, shocks to the system might well originate in the markets for these other buffer stocks, and we should be careful in their presence not to insist on a theoretically unique role for the money supply as a source of disturbances. Moreover, even when a change in the money supply is the disturbing factor under analysis, variations in stocks of these other assets will surely play a role in the economy's subsequent adjustment. That is to say, their existence affects the number of and type of shocks to which an economy might be subjected, and it will also affect the details of the transmission mechanism. None of this, however, means that changes in the money supply will necessarily cease to be important, or that buffer-stock analysis throws no light on their transmission mechanism.

Concluding Comments

The argument that I have advanced in this lecture is easy to summarize. I have claimed the very existence of monetary exchange implies that the economy should be characterized by a certain degree of ignorance and price stickiness. I have claimed this argument to imply in turn that the transmission mechanism for monetary policy involves a chain of causation that runs from discrepancies between agents' actual and desired money holdings to flows of expenditure on goods and services, thence to changes in interest rates, output, and eventually, as the only lasting consequence, to price level changes. I have contrasted this view with two undoubtedly more fashionable alternatives, suggesting that new-Classical economics has nothing to say about the transmission mechanism, and that orthodox Keynesian economics places undue emphasis on the behavior of interest rates in a
sequence of events otherwise rather similar to that suggested by buffer-stock analysis. I have thus tried to show that the buffer-stock approach is the most plausible among available ways of thinking about an important class of monetary issues, and I have also suggested that its essential usefulness, though best seen in the context of a model with a clearly defined and exogenously determined money stock, is not destroyed as we move to a more complicated monetary environment. I have also referred, along the way, to certain policy implications of my arguments. I have drawn attention to the inherent variableness of the transmission mechanism implied by buffer-stock analysis, showing that such analysis may underpin a case against attempts to use discretionary policy in order to influence real economic variables. It should be noted that this case is different from the new-Classical case against such measures. In new-Classical analysis any systematic policy, because it is "anticipated," will influence only prices, and steady money growth emerges as the best policy because it is the simplest. The buffer-stock approach distinguishes between "expected" and "anticipated" policies and predicts that systematic policies can indeed have real effects. However, it warns that their magnitude and timing are sufficiently uncertain as to render them positively dangerous. Hence, it makes a much stronger case for steadiness in the conduct of monetary policy than does the new-Classical alternative.

Though I have put the above arguments to you because I believe them to be closer to the truth about certain important issues than currently available alternatives, let me nevertheless end this lecture with a warning. A priori plausibility does not make an argument right. Though theoretical exercises a good deal tighter than anything I have engaged in here do exist, and though empirical evidence bearing on the issues I have raised, and tending to favor the buffer-stock approach, is available, there is, in the current state of knowledge, ample room for reasonable people to disagree about the importance of the issues I have raised. I do not, therefore, ask that my listeners be convinced of the correctness of what I had to say. I shall have succeeded in my aims this afternoon if I have convinced some of you that the ideas I have discussed deserve your attention and consideration in the future as you think about monetary issues.

*I am grateful to Michael Burns and Johan Myrheim for discussion of many of the issues dealt with here, and to Peter Abken, Russell Boyer, Joel Fried, and Peter Howitt for helpful comments on an earlier draft, but I do not wish to implicate them in any errors remaining herein.
A macroeconomic model incorporating the essential features of the analysis discussed informally in this lecture may be set out as follows. All variables except interest rates are measured in logarithms, and are defined as follows: $y^*$ is the permanent, or full-employment equilibrium, level of real income; $y$ is the transitory, or cyclical, component of real income; $m$ is money and the subscripts $s$ and $d$ refer to supplied and demanded; $p^*$ is the level of the real interest rate that is compatible with full employment equilibrium, the Wicksellian "natural" rate; $p$ is the difference between the actual real rate of interest and its natural value; $r$ is the nominal interest rate; $p$ is the price level; $E$ is the expectations operator; $I$ represents information used in forming expectations; and the subscripts -1 and +1 represent a one-period time lag and lead respectively.

**THE MODEL**

The Demand for Money

$$M_d = \delta_0 + \delta_1 y^* + \delta_2 y - \delta_3 r + p$$

The Nominal Interest Rate

$$r = p^* + p + (Ep_{t+1} - p)$$

The Real Interest Rate

$$p + p^* = \gamma (M_s - M_d) + p^*$$

Output

$$y = a_1 (M_s - M_d) - a_2 p$$

The Price Level

$$p = \beta y + Ep_{t+1}$$

Expected Inflation

$$(Ep_{t+1} - p) = (EM_s - p) - M_{s-1}$$

The above model is analyzed extensively in Laidler (1987), but the following observations upon its properties may be helpful.

(i) Though similar in some respects to an IS-LM model supplemented by an expectations-augmented Phillips curve, this model cannot be analyzed using the IS-LM framework. It is a *sine qua non* of the LM curve that the economy be "on" its demand-for-money function, and the presence of a discrepancy between the quantity of money supplied and demanded in this model means that this condition will hold only when the model is in full equilibrium, and this discrepancy happens to take a zero value.

(ii) Though expectations about the money supply may be thought of as "rational," there is no requirement that this be the case. Moreover, and crucially, inflation expectations are based entirely on the expected rate of monetary expansion and therefore are only asymptotically rational in this model. This property, which may be defended with respect to the arguments about the costs of acquiring information set out in the text of this lecture, is crucial to this particular model's behavior.

(iii) There is, as noted in the text of the lecture, no particular reason to suppose that the coefficients linking aggregate demand or the interest rate to discrepancies between the supply and demand for money will remain stable and predictable over time in any real-world economy. Nor is there any reason to suppose that the coefficient linking the price level to the level of transitory income in the Phillips curve equation will be independent of the conduct of policy.

(iv) One may obtain a feel for the transmission mechanism of monetary policy in this model by noting that an unanticipated increase in the money supply will lead to a discrepancy between the supply and demand for money, and thus it will affect aggregate demand both directly and indirectly as it drives down the real rate of interest; this first round effect will put upward pressure on prices; all three effects will tend to diminish the discrepancy between money supplied and demanded; and a dynamic process, which will eventually restore the economy to full employment equilibrium, will be set in motion by the above effects.

(v) This model can incorporate a Keynesian theory of economic disturbances, since an increase in the marginal efficiency of capital will cause $p^*$ to rise, and vice versa. The discrepancy between the demand and supply of money that this would cause will act as a stabilizing factor. The model could also be extended to include fiscal policy effects on aggregate demand.

(vi) The model yields, as a reduced form for the behavior of the real quantity of money in circulation, an equation of exactly the form frequently referred to as a "short-run demand-for-money function." In particular this equation has a lagged dependent variable on its right-hand side.
FOOTNOTES

1Even so, let it be explicitly pointed out that the work of Bordo, Choudry, and Schwartz (1984), Carr and Darby (1981), and Gordon (1984) on the demand-for-money function, and Greenfield and Yeager (1986) on the role of credit markets in the money supply process are notable contributions to the literature of what I am here terming the buffer-stock approach.

2The genesis of modern work on this approach to modelling the demand for money is to be found in Patlinik (1965). The contributions of Miller and Orr (1966), Weinrohe (1972), and Gray and Parkin (1973) are also noteworthy in this context.

3There is, as was noted by Laidler (1974), a relationship between the information-economizing role of money discussed here and the similar function accorded to prices in traditional accounts of the virtues of market mechanisms. Both Peter Howitt and Peter Abken have drawn my attention to the fact that the arguments which I advance below about the incompatibility of the existence of money with models that describe what one might term a “full information” equilibrium for the economy also run strongly parallel to those advanced by Grossman and Stiglitz (1976). They assert that the very existence of a price system is incompatible with the assumption that agents have access to enough information to ensure that such a system can attain general equilibrium in the absence of an auctioneer.

4The class of models referred to here is criticized in more detail in Laidler (1982d), Chapter 3. Since that book was written, these models have begun to fall out of favor among economists because of the difficulties they have encountered with empirical evidence. As McCallum (1986) has noted, the choice now seems to be between “real business cycle” models, which maintain the new-Classical assumptions of clearing markets and rational expectations but accord no role to money in generating real fluctuations, and models in the tradition of Fischer (1977) and Taylor (1979) that base price stickiness on the existence of nominal contracts. Buffer-stock effects are, of course, quite compatible with the existence of nominal contracts, and models incorporating them are a particular subset of the general class of sticky price models.

5In the 19th century Leon Walras pioneered the economic theory of general equilibrium in which costs, outputs, and supplies in all markets are determined simultaneously.

6The relationship between the role of money as a buffer stock, and traditional analysis of real-balance effects is one of the topics explored in Jonson’s seminal (1976) paper on this topic.

7It should be noted that, to the extent that the demand for real balances depends upon the expected inflation rate, periods of transition between one equilibrium inflation rate and another will be marked by a short-run tendency for the inflation rate to overshoot its new long-run equilibrium value.

8It has already been pointed out that traditional new-Classical analysis has tended to fall out of favor lately. Even so, the foregoing criticism of its treatment of the transmission mechanism is not directed at a straw man. New-Classical models still have an important place in the textbook literature, and as far as current research is concerned, real business cycle models, of the type pioneered by Kydland and Prescott (1982), deny a role to money in generating real fluctuations because their proponents believe all variations in the quantity of money to be readily and immediately observable. They therefore believe that such variations will be absorbed immediately in price level fluctuations induced by the expectational effects described in the foregoing argument. Thus, real business cycle models are vulnerable to the criticism that they treat the transmission mechanism linking monetary policy to the price level as a purely psychological phenomenon.

9The reader who finds algebraic analysis helpful might consult the appendix, where a typical model incorporating buffer stock effects is set out and briefly described.

10This matter is discussed at greater length in Laidler (1984).

11The reader who is familiar with Greenfield and Yeager (1986) will recognize the essential similarity between their argument and that sketched here.

12On this matter see the appendix.

13Rasche (1987) levels this criticism at a certain simple type of buffer-stock model.

14These issues are discussed in some detail by Gordon (1984).

15Purvis (1979) analyzes the role of what might fairly be termed “buffer-stock effects” in a Tobinesque model involving a multiplicity of liquid assets.

REFERENCES


