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THE WELFARE COSTS OF INFLATION IN
NEOCLASSICAL THEORY--SOME UNSETTLED
PROBLEMS*

by

ECONOMICS REFERENCE CENTRE

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* First draft of a paper prepared for the I.E.A. Conference on Inflation Theory and Anti-inflation Policy held in Saltsjöbaden, Sweden, August 28 - September 3, 1975. I have benefitted greatly from discussions of the issues dealt with in this paper with Alan Coddington, Laurence Copeland, Alvin Marty, Michael Parkin, and George Zis. Since none of those whom I have implicated has yet had the opportunity of reading a draft of this paper, the usual disclaimer, that any errors and omissions it might contain are the author's sole responsibility, is to be taken particularly seriously.

I

The worldwide inflation of recent years has slackened off markedly in most countries over the last twelve months. However, even in such low inflation countries as Germany, it is still running at a rate which, a decade ago, would have been regarded as intolerably high. Moreover, the recent reduction in inflation rates has been achieved only at the cost of unemployment levels unprecedented in the post-war period. It is far from clear that the current recession will anywhere be permitted to last long enough to bring inflation back to the levels of the early 1960s; indeed there are good reasons for believing that recovery from the current recession will be accompanied by an acceleration of inflation as demand is permitted to expand before the inflationary expectations generated over the last five years are completely removed from the system.

Because inflation is difficult and painful to cure, there is a plausible case to be made for learning to live with it instead. It is widely argued that inflation is at its most socially destructive when it is not anticipated. However, unanticipated inflation is also relatively costless to cure. Depression and unemployment become a necessary accompaniment to slowing down the inflation rate only when inflationary expectations have become embedded in the price setting and wage bargaining processes. On the other hand, the more fully adjusted is the economy to the presence of inflation the less socially disruptive is its continuation. Neoclassical monetary theory would have it that, in the limit, when inflation is fully anticipated the only costs it imposes are those associated with the community's attempts to economize on non-interest bearing money balances. This limiting case is precisely the one in which the costs of reducing inflation in terms of

unemployment--not to mention in terms of the other phenomena such as the disruption of debtor-creditor relationships that would accompany an unanticipated reduction in the inflation rate--are maximized.

Given that this is what contemporary economics tells us about the policy options when inflationary expectations are deeply embedded in the economy, it is hardly surprising that many find the case for trying to live with inflation rather than attempting to cure it a strong one. I shall examine one aspect of this case in this essay: namely neoclassical analysis of the welfare costs of anticipated inflation. I shall argue that conventional theory underestimates those costs and that it does so because it concentrates on money's role as a store of value for the individual economic agent to the exclusion of considering the effects of anticipated inflation on money's roles as a means of exchange and a unit of account. My arguments strengthen the case against living with inflation, but they by no means make that case. The most appealing feature of the application of Marshallian welfare analysis to inflation is that it appears to permit quantification of its resource costs, and I shall not here suggest means of quantifying the extra costs, associated with anticipated inflation, which the following arguments suggest should be taken into account.

The admission is not fatal in the current context. The costs involved in bringing down the inflation rate below its anticipated level are not quantifiable either in terms analogous to the welfare measures that we use in dealing with anticipated inflation. The latter measure utility foregone as a result of misallocating a stock of fully utilized resources. Part of the cost of bringing down the inflation rate involves leaving some resources unutilized, albeit temporarily. To be sure, certain contemporary approaches to the theory of unemployment would have it that such resources are simply misallocated in the direction of search activity rather than being totally unused, but there is no solution to

our problem along these lines. Even if we relable "unemployed" resources as "misallocated," the misallocation in question is not of the type that orthodox welfare analysis deals with.¹ It is of the essence of orthodox analysis that agents act in response to incentives and achieve the expected outcome of their decisions. Misallocations arise because private incentives do not accurately reflect social constraints. Unemployment arises (or a shift of resources towards search activity takes place) because individuals act on the basis of expectations which are not, in the event fulfilled. The ex post outcome of actions differs from that expected ex ante, and we have no welfare economics of the consequences of mistaken decisions.

The same argument applies to our ability to assess the importance of that other consequence of unanticipated changes in the inflation rate, the disruption of debtor creditor relationships (in favor of creditors, be it noted, when the inflation rate is slowing down). Orthodox welfare economics has little to say about distributional effects that arise from privately appropriate responses to changed constraints, let alone about those which arise from erroneous decisions.

In short, we do not know how to quantify the costs associated with unexpected variations in the inflation rate, and it is the burden of this paper that we know less than might have been thought about the nature of the costs involved in living with perfectly anticipated inflation, though all the arguments I shall present suggest that these are greater than conventional neoclassical analysis would have them. In the next few pages, I will first set out a version of that conventional analysis before submitting it to what I hope will be judged constructive criticism.

II

I shall present the conventional analysis of the effects of fully anticipated inflation on economic welfare in terms of a simple one sector neoclassical growth model of the type widely employed in work on the long run neutrality of money. Such a model is open to criticism for begging important questions about the role of money in the economy; I use it here not because I regard criticism of it as invalid but because it seems to me to be a useful starting point for raising the questions which I wish to take up in this essay.

Figure 1 sets out a particular version of the model in question. It depicts an economy with one output, produced by two inputs, "capital" and "labour," the capital input being transformable from and into the single output costlessly and in fixed proportions.² The population grows at a constant, exogenously determined rate, and the supply of labor is proportional to the population. The production function in this economy displays constant returns to scale and diminishing returns to each factor. Thus output per head of the population is a unique function of capital per head of the population. With pure rates of flow measured on the vertical axis, and capital per head on the horizontal, the downward sloping curve in panel (a) of Figure 1 depicts the marginal product of capital as a function of capital per head.

There are many ways of characterizing savings behavior in a model like this one, and here we follow the lead of Sidrauski (1967): the capital stock per head is always maintained by savings at a level k_0 at which the marginal product of capital--a pure rate of flow because of our ability to measure capital and output in the same units--is equal to the rate of time preference. For present purposes this rate of time preference is assumed to be constant and equal to the rate of growth of the population. Thus, our economy's long-run equilibrium growth path has the following properties: saving as a proportion of national income is

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equal to profits; consumption is equal to labor income; in terms of Figure 1a, the area ABC is consumed, while O_k CBD is saved in order to maintain the capital labor ratio constant as the population grows.

Money is introduced in panel b of Figure 1. It is an asset produced at zero marginal social cost, but which bears no interest. It makes no difference to the following analysis whether money is thought of as the liability of the government or of a privately owned banking system and the reader may take his choice here.³ The demand for real money balances per head is independent of the population and of the price level, and is measured from right to left in Figure 1b. The demand for real balances per head is assumed to depend inversely on the nominal rate of interest, this variable in turn being given by the sum of the marginal product of capital and the expected rate of inflation. We are dealing here with situations of long-run equilibrium so that the expected and actual rates of inflation are equal to one another. Moreover, in the model as constructed, output per head is independent of anything that might happen in the money market--indeed it is constant--so there is no need to complicate the analysis with awkward questions about the relationship between the demand for real balances and national income per head.

In this economy, if the quantity of nominal money balances is held constant over time, then there will of course be a negative inflation rate just equal in absolute value to the economy's rate of growth γ . Because of our special assumptions, the rate of growth and the real rate of return on capital are equal to one another. Hence, with a zero rate of nominal monetary expansion, the nominal rate of interest will be zero and real balances per head of m_0 will be held. The standard welfare analysis of money tells us that the amenity yield of money per head is given by the area under the demand curve for it, O_m DE in this case; that same analysis tells us that a situation of Pareto optimality exists in the money

market because the private and social marginal opportunity costs of real balances are equal at zero. In a model such as this one, any positive rate of monetary expansion is sub-optimal; a rate of monetary expansion such as λ_1 in excess of the economy's growth rate will, for example, generate a rate of inflation π equal to $\lambda_1 - \gamma$, a nominal interest rate of $\rho + \pi$, and a demand for real balances per head equal to m_1 . As compared to the optimal zero monetary expansion case, the amenity yield on money is reduced by EFG, this being the loss in economic welfare associated with a fully anticipated inflation rate of π .

Now there are of course many awkward questions that can be raised about treating an area such as EFG under any demand curve, let alone under a demand curve for real balances, as a measure of economic welfare. Consumer's surplus only has a unique value given by the area under the individual's demand curve for a particular good on the quite stringent assumptions that the marginal utility of all other goods to the individual is constant and independent of the quantity being consumed of the good under analysis. This problem is sidestepped in the foregoing exercise because the model we have chosen to use is one in which money is neutral; there is no question of variations in the inflation rate affecting the quantities of real output produced and consumed and hence influencing the utility of money's services. In a model with non-neutral money, the consequences of varying the rate of nominal monetary expansion, and hence the inflation rate, would involve shifts of, as well as movements along the demand for money function, unless we made the patently false assumption that the per head income elasticity of demand for real balances was zero. In this case welfare measurement would have to be undertaken with general equilibrium rather than partial equilibrium tools. Quite apart from this problem concerning the uniqueness of our measure of welfare, we are here dealing not with the economic welfare of an individual but with what purports to be a measure of aggregate economic welfare. There are

many who would question the propriety of discussing welfare in the aggregate without taking account of distributional factors, while others would go so far as to question the meaning of any such aggregate measure, distributionally weighted or otherwise.⁴

Problems such as these are common to any application of welfare economics and though they are certainly relevant to the seriousness with which we take orthodox analysis of the welfare costs of inflation, they are not central to the issues that I wish to raise in this paper. The latter arise from taking a closer than usual look at the nature of money and the amenity flow that it provides. The analysis which was sketched out above has its origins in the work of Bailey (1956), and represents an application to a normative, rather than positive, problem of Friedman's (1956) restatement of the quantity theory as a theory of the demand for money.⁵ In his essay Friedman has very little to say about the role that money plays in the economic system. He is far more concerned with analyzing the factors that influence the amount of money people will hold than in explaining why money is held. He refers to money as a "temporary abode of purchasing power" and proceeds to analyze the factors determining the demand for it as if it were essentially the same as any durable good that provides a flow of services to its owner. He treats the theory of the demand for money as a special case of his permanent income hypothesis of consumption, and in emphasizing his theory's predictions about behavior rather than in paying attention to producing a set of precise and descriptively accurate assumptions to underpin it, Friedman is simply putting into practice his own methodology of positive economics (cf. Friedman (1953).)

Now there can be no doubt that, in treating money as if it were a consumer durable good, and in applying to the analysis of the demand for it the tools of Fisherian capital theory, Friedman and his associates laid the foundations of an enormous advance in our understanding of the interaction of money and economic

activity. The modern quantity theory is surely a prime example of the power of the "as if" methodology applied to positive economics. But here we are dealing with an application of this analysis to a different set of questions. A simplifying assumption that is powerful and fruitful in one application of a theory may be dangerously misleading in another application.⁶

The ease with which the costs of inflation illustrated in the foregoing analysis can be removed suggests that some such problem might be present here. If the monetary authorities were to pay the equilibrium nominal interest rate available on other assets on money balances, the opportunity cost of holding the latter would be zero and the economy would be in a state of Pareto optimality at any rate of inflation. In the special case which I have explicitly analyzed, it would suffice that newly printed nominal balances found their way into circulation as interest payments on existing money balances to ensure that inflation had no costs. In general this means of financing interest payments on money would not do, of course, but other methods are not hard to devise.⁷ If we take the foregoing analysis seriously as an account of the social damage done by anticipated inflation, any economy which has long undergone inflation at a more or less stable rate can avoid damage from letting inflation continue simply by paying interest on its money stock at the appropriate rate. Though we might find widespread agreement that such a step would help matters, it is hard to believe that there are many who would think that such a step would make inflation irrelevant.

Now some of the skepticism about the ease with which the above analysis suggests the costs of inflation can be removed arises from the fact that a model such as we have been considering starts from a situation in which everything except the rate of return on real balances is already adjusted to inflation. Implicitly it deals with an economy in which taxes and transfers are fully indexed and in

which the rates of return on all other nominal assets are fully adjusted to inflation. For the latter condition to hold, a term structure of accurate inflationary expectations must be built into the term structure of interest rates, and have been built into it for sufficiently long that no holder of a maturing or soon to mature long-term asset will receive ex post a real return that differs in any way from that which he expected to receive ex ante when he purchased the asset. To meet these conditions is a tall order and it is clear why proposals for widespread indexation must be a necessary accompaniment to any proposal for living with inflation that rests on the proposition that the welfare loss associated with a less than optimal quantity of money is the only cost of living with inflation. Even so, there are other problems here to which I now turn in more detail.

III

As we have seen, the analysis of the welfare costs of anticipated inflation is based on a theory that, in treating money as a "temporary abode of purchasing power", emphasizes its traditional store of value role. It views money as a durable good that yields an undefined amenity flow to its owner in a way that makes money exactly parallel to a refrigerator or to a piece of sculpture. There is no doubt that this approach has proved extremely fruitful in generating useful predictions about aggregate demand for money functions of the type used in short-run macroeconomic models. However, consider the archetypical isolated economic agent, Robinson Crusoe: he might obtain a flow of services from a refrigerator or from a piece of sculpture and hence demand one, but not from a "temporary abode of purchasing power". It would be absurd to postulate that he would demand real balances because they yielded him an amenity flow. Money's desirability as a store of value derives from its role as a means of exchange and exchange requires more than one agent in the economy. Even two agents would gain nothing from abandoning

barter. It is only when indirect trade becomes a possibility that there is any gain to be had from adopting one particular item as a generally accepted means of exchange.

Money is inherently a social phenomenon, and yet the monetary theory on which our welfare analysis of inflation is based treats it as if money holding were a purely private affair. In dealing with money holding and the welfare it generates on a per head basis, we implicitly take it for granted that the economic welfare generated for any individual agent by his own money holdings is the only welfare produced by them, that the social product of the money stock is simply the sum of the private products accruing to the individual holders of its components. I would suggest, to the contrary, that there is something of the nature of a public good about money, and that we should be wary indeed of treating the sum of its private products as its social product. In order to develop further the conjecture that there are externalities in the consumption of money's services, let us look at those theories of the demand for money that emphasize its means of exchange role, theories of the transactions demand for money.

The most popular transactions demand model, the so-called Baumol-Tobin inventory approach, is not helpful here. Appealing though it is at the level of the individual agent, this analysis makes little sense at an aggregate level.⁸ A more useful approach to the problem stems from the work of Brunner and Meltzer (1971) and Patinkin (1956). The former analyze the social productivity of money, showing that the existence of a universally accepted means of exchange enables those involved in a market economy to realize the gains from trade at less resource cost than in its absence. They argue that, by holding an inventory of money balances, the individual provides himself with a buffer stock of a readily tradable commodity that enables him to carry out his market activity on the basis of

less information about the structure of prices than he would require in its absence. Such information is costly to generate, and money holding enables the individual to economize on its acquisition.⁹

Now clearly when there is uncertainty about the behavior of trading partners, about what goods are going to be available when and at what prices, there is going to be a stochastic element to the timing of any individual's pattern of payments and receipts. Patinkin makes such a stochastic element the basis of his theory of the demand for money by arguing that inability to make a payment when it is called for imposes costs in terms of embarrassment on the individual. To this we may add that running out of cash unexpectedly is not only embarrassing but costly in other ways as well. It can lead to the unexpected cancellation of transactions plans that would have generated gains had they been followed through, and/or to costly sales of less liquid assets to replenish money holdings.¹⁰

To approach the analysis of the demand for money along these lines makes it easy enough to see where externalities may arise from money holding. The random element that is present in any one individual's pattern of payments and receipts must arise from the decisions and actions of other agents. The more real balances other agents hold on average, the less likely is it that they will be unable to make a purchase that they would normally have undertaken, or that they will delay in handing over cash when presented with a bill. Moreover, the less likely is it that they will unexpectedly present a bill of their own, or perhaps call in a debt, to replenish an unexpected shortfall in their own cash balances. Thus any one agent, holding cash balances of a given average size, is less likely to incur the costs of temporarily running out of cash, the larger are the average balances of those with

he trades. Any one agent's cash balances produce services not just for himself then but for all other agents with whom his market activities might bring him into contact.

On the foregoing argument, the social productivity of the money stock is higher than its private productivity and it is of course changes in the social productivity of money that are important as far as the assessment of the welfare costs of inflation is concerned. The conventional neo-classical analysis of those costs, set out in the previous section of this paper, deals only with the effects of inflation on the private productivity of the money stock and hence underestimates the welfare costs of anticipated inflation. This is not the only way in which it does so, as we shall now see.

The conventional analysis set out above takes it for granted that the number of economic agents in the economy is exogenously given, but the term economic agent is vague to the point of ambiguity. Much of the literature on money and economic welfare deals with the determination of output per head, and analyzes the determinants of the demand for money per head; in doing so it unquestioningly identifies the biological individual as the relevant economic agent. From the point of view of monetary theory this will hardly do. It is firms and households whose activities are coordinated through markets in which money functions as a means of exchange. The activities of individuals within these institutions are coordinated on a different basis. In a market economy individuals voluntarily join firms, households, and other institutions and it is now four decades since Coase (1937) pointed out that the question as to whether particular activities would be coordinated within an institution--specifically a firm in his case--on a command basis, or between institutions or institutions and individuals on a market basis, would

depend upon the relative costs and benefits associated with these alternative means of organization.

Now clearly, one of the costs associated with coordinating activities through markets rather than within institutions is the cost of holding money. If inflation, even fully and correctly anticipated inflation, increases those costs, then it is to be expected that, on the margin, some activities which, from the social point of view, would be better coordinated through markets will instead be organized on some other basis, either within larger firms than might otherwise exist, or within cartel arrangements, or by resort to one form or another of government planning. Thus it is not only that, in the presence of inflation, existing agents will receive a smaller amenity flow from their cash balances and will have to spend more time and trouble planning their economic activities; it is also likely that there will be fewer agents participating in market activities. Thus there is a further potential loss of economic welfare arising from anticipated inflation that results from society's devoting real resources to the organization of economic activity within institutions, activities that would, in the absence of inflation, be more cheaply organized on a market basis. This again is a matter of which neoclassical monetary theory takes no account in attempting to measure the resource costs of anticipated inflation.¹¹

The potential effects of anticipated inflation on the efficiency of the monetary system which we have been considering so far all arise from anticipated inflation making it more expensive to hold real balances. Our analysis has money becoming less productive overall as a result of inflation because the economy uses less money and not because anticipated inflation actually impairs its productivity. Thus the damage to the monetary system that we have been discussing in the last few pages, though additional to the costs of anticipated

inflation upon which conventional monetary theory focusses, may nevertheless presumably be avoided by the conventional remedy of paying interest at an appropriate rate on money balances. Now it is widely recognized that inflation which is less than perfectly anticipated undermines money's social productivity by making it a less efficient substitute for devoting resources to the generation of information upon which plans can be based. Even in a state of perfectly anticipated inflation, however, there seems to be scope for such an effect, for there to occur shifts of, as well as movements along, what might be termed the marginal social product of real balances schedule. The problem here is best seen by focussing on money's role as a unit of account.

Money is the item universally acceptable in exchange for any commodity, and it is economic for all traders to state the price of the goods they have to sell, or wish to purchase, relative to money, the item they intend to exchange them for. Thus money's unit of account function is closely related to its role as a means of exchange. I would argue that inflation makes money less productive because it makes less reliable and more difficult to interpret the information about relative prices contained in the array of money prices about which any agent may have information. To say this, of course, is in some sense to call into question the very notion of "perfectly anticipated" inflation upon which conventional analysis is based and which has underlain our discussion so far in this paper.

It is customary to discuss "the general price level" when talking about inflation, and the analysis with which we began this essay treats that concept as if it were the price in terms of money of a single good; but of course it is not, it is an index number. By "perfectly anticipated inflation" we must mean that the rate of change of that index number is correctly foreseen over every relevant time horizon and that this foresight is acted upon. In an economy

in which there were no reasons for relative prices to change over time, a continuous upward change in the money price of each good at an equal rate would be consistent with a fully anticipated inflation, as would continuous changes at different rates in the money prices of goods, holding the rate of change of the price index constant, in an economy in which relative prices were changing. The analysis we have carried out so far of the consequences of inflation would be adequate to deal with cases such as these.

But what about the resource costs of changing prices, and of disseminating information about their having changed? If such costs did not exist then the view of money's social role which underlies this essay would tell us that money would not exist, and without money there could hardly be inflation. Thus it is difficult to defend ignoring these costs on the grounds of analytic simplicity when dealing with inflation, but that is what we have, in effect, been doing.¹²

Part of the appropriate response to this problem is to note that economic agents do in fact have to devote real resources to changing prices and to disseminating and collecting information about them, and that, to the extent that there are more changes in money prices during inflation, the extra costs associated with making them are part of the overall cost of inflation. However, the matter goes a little deeper than this. The costs of changing a price, and of spreading information about such a change do not depend upon the size of the price change in question. Barro (1972a) has shown that, in such conditions, the present value maximizing firm will vary the price of its output in discrete steps in response to a continuous shift in the demand curve facing it. This would imply that, during an inflation, firms will change their output prices discretely and also perhaps that input prices will rise in discrete steps. There is no reason to suppose that the timing of such price changes will be coordinated across firms and industries.

It is thus perfectly possible that the overall value of an economy's general price index can change at a continuous and perfectly foreseen rate while the pattern of relative prices underlying it fluctuates as different firms and industries change their output prices at different moments. Such inflation induced fluctuation in the pattern of relative prices would both reduce the amount of information about relative prices to be generated from any particular sampling of money prices, and it would also open up incentives for the devotion of resources to speculative activity that would not exist in the absence of inflation.¹³ The social productivity of the monetary mechanism as a means of coordinating economic activity is thus potentially further reduced by inflation in yet another way that is overlooked by conventional analysis and there are further incentives implicit here towards the organization of economic activity by nonmarket mechanisms.¹⁴ Moreover, the costs in question here are not such as can be avoided by paying interest on money in an otherwise fully indexed economy. Indeed the resource costs of indexing taxes and transfers, the scope for tax avoidance and such that would be opened up by changes in tax rates inevitably being made at discrete intervals, not to mention the difficulties of devising means whereby interest could effectively be paid on money, particularly on currency, are particular examples of the types of costs we have just been discussing. In an inflationary economy it might be preferable to incur these costs than not to do so, but the absence of inflation would be a still more preferable state of affairs.

IV

It now remains to summarize the arguments presented in this paper. Inflation has now become deeply embedded in the economic system, and there seems little prospect of ridding ourselves of it without generating significant unemployment for a substantial period of time. In the light of this, the alternative

of living with inflation is certainly worth considering and is not without its advocates. No-one suggests that living with inflation would be costless, but there is a large body of literature whose principal conclusion is that, once inflation has become fully anticipated, its only costs arise from the inefficiency in the monetary mechanism which the incentives to economy in holding real balances, inherent in anticipated inflation, lead to. This literature also suggests that these costs may be measured in terms of the appropriate area under the aggregate demand for real balances function.

It has been the burden of this essay to argue that this approach to assessing the costs of living with anticipated inflation misses many aspects of these costs, and that it does so because it overstretches the applicability of the assumption that the role of money in the economic system may be analyzed as if money was simply a durable good yielding a flow of services to those who hold it. This assumption is powerful in generating predictions about what arguments belong in the demand for money function, and in organizing analysis of the role of the quantity of money in short-run stabilization policy, but is potentially misleading in the present application. Consideration of analysis which pays more explicit attention to the specific functions of money in the economic system points to at least three aspects of the potential costs of anticipated inflation that orthodox neoclassical analysis overlooks.

First, there is reason to believe that there are externalities in the consumption of money's services; that the social losses from individual agents' economizing on cash balances in the face of inflation are greater than the sum of the private losses. Second, a market mechanism that uses money is by no means universal as a way of coordinating the economic activities of individuals. The more costly is money to use, the more aspects of economic activity are likely to be organized on some more costly alternative nonmarket basis.

This tendency is also inherent in the final potential problem with inflation raised in this paper--namely the possibility that relative prices fluctuate as a result of inflation itself even if the overall rate of inflation is completely stable and predictable. Such fluctuations would also tend to undermine the effectiveness of market mechanisms based on the use of money as a means of organizing economic activity.

Now it should go without saying that the above arguments are tentative. I have presented no evidence which would enable anyone to judge their quantitative significance. However, although the ideas in question are not sufficiently developed in this paper immediately to be susceptible to empirical tests of their importance, there is no reason why they cannot not be so developed. They do, after all potentially have implications about merger activity and its relationship to inflation, about the behavior of relative prices during inflation, and so on. With further work we ought to be able both to derive such implications more precisely and subject them to test. The only excuse for not doing so here can be that one can only accomplish so much in one paper. Nevertheless, if this essay convinces the reader that the ideas contained in it are worth further development so that their empirical importance can better be assessed, and that, pending such further development, he should be wary indeed of accepting orthodox neoclassical measures of the welfare costs of anticipated inflation as being well founded or in any way comprehensive, it has fulfilled its purpose.

Footnotes

¹For analysis of unemployment as search activity, see for example Alchian (1970). I have dealt with this approach to unemployment in more detail in Laidler (1974).

²To analyze the role of money with a model of an economy producing one good is, to put it mildly, dubious. This has been a much criticized characteristic of the type of analysis discussed here. See for example Clower (1967). I shall take up some of the issues below pp. 15-17.

³I have gone into this issue in terms of the model used here in another paper--Laidler (1975)--where I have also extended the analysis to non-neutral money cases. Nothing in the present paper hinges upon the special assumptions made here. Their role is purely a simplifying one.

⁴The locus classicus for the case against making intrapersonal utility comparisons is, of course, Robbins (1935).

⁵In referring to this application to welfare economics as "normative" I am following what I believe is common usage. Note however, that, at least at the level of the individual, propositions about the effects of particular changes on consumer's surplus are in principle testable. One can conceive of offering a subject the choice between positive or negative compensation and a change on the one hand, and neither compensation nor change on the other, and observe the outcome. The main point in the present context is not that this application to welfare economics is normative, but that it involves an area beyond the empirical scope of the theoretical framework as originally conceived.

⁶Friedman's methodology is the methodology of a practitioner, rather than of a detached observer of economics, as Alan Coddington has stressed to me. But the pragmatism that rightly leads one to the view that the behavior of an expert billiard player at the billiard table can usefully be predicted by analyzing it as if he were an expert mathematician can cause trouble if it also leads one to predict the same billiard player's performance in a mathematics examination on a similar basis.

⁷Indeed it would only do so in this special case. In other cases we can think of interest payments being financed out of the receipts of lump sum taxes, or out of revenue generated for the monetary authorities by productive assets which they may, in the past, have purchased with newly created money.

⁸Though this analysis deals with money holding as a means of reducing transactions costs, the costs in question are those that arise in trading between money itself and interest-bearing assets, and not in trading among goods. In the aggregate this approach would have half the economy making continuous payments and receiving receipts at discrete intervals, and vice versa for

the other half. To get the whole money stock continuously held, the continuous receivers would have to take cash to the bank to exchange for bonds at the same moment that the continuous payers took bonds to the bank in exchange for money. The economy could, in short, dispense with the bank, and having done that could achieve a further resource saving by adopting interest earning bonds as its means of exchange. Baumol-Tobin "money" has no social role to play and those approaches to the analysis of the welfare economics of a money economy such as Barro (1972b) or Feige and Parkin (1971) that are based on this theory do not seem to be any better founded than the neoclassical analysis under scrutiny in the preceding few pages.

⁹ I have gone into this analysis in much more detail in Laidler (1975).

¹⁰ Patinkin does not add these riders because, in his analysis, trade among goods takes place, at equilibrium prices, before agents settle up in terms of money. Models of the demand for money based on a stochastic element in the pattern of payments and receipts have, of course, received much development since Patinkin's work. A survey of more recent work is to be found in Orr (1971).

¹¹ And although I have stressed only the economic aspects of the above arguments, they clearly have strong political overtones. In their light, it is not difficult to understand why it is that those who have most faith in the market mechanism as a desirable form of socio-economic organization also seem to have the strongest objections to inflation.

¹² Resource costs of obtaining and disseminating information about prices lie at the root of Brunner and Meltzer's analysis of the productivity of money. I have gone into this matter in much more detail in Laidler (1974).

¹³ Of course speculative activity would tend to reduce such fluctuations in relative prices, but at a real resource cost. Uncertainties about the time path of prices are recognized to lie at the root of much of the damage that so-called unanticipated inflation can do. The above arguments, in suggesting that they might be present even when the time path of the overall price index is fully anticipated, perhaps provide a basis for a closer integration than we have previously seen of the analysis of anticipated and unanticipated inflation.

¹⁴ Again, therefore, there are political overtones to these arguments. Cf., footnote 11.

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