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# A Real Theory of Inflation and Incentive Anti-Inflation Plans

By DAVID COLANDER\*

Inflation is a monetary phenomenon. It is also a real phenomenon, by which I mean that it is the result of individuals' choices and that it has effects on the real economy.

Monetary theories of inflation analyze inflation as a monetary phenomenon without specifying the underlying individual behavior consistent with that inflation. They are typically black-box theories which assume that a fully expected inflation has no effect on the real economy. Real theories of inflation are not black-box theories; they are built up from micro foundations. Since inflation is a monetary phenomenon, in order to have a real theory of inflation, one must necessarily have a theory of how money fits into the aggregate economy. All real theories of inflation must be monetary theories of inflation. The difference between a real theory and a monetary theory is that a real theory looks inside the monetary black box and highlights the real-world mechanisms through which money and inflation are related. In that black box one sees that individuals, not "the market," set prices. The prices they set are nominal prices first, and relative prices second. A real theory of inflation analyzes how individuals choose those prices, how the quantity of money can affect their choices, and what effect their choices have on the aggregate equilibrium.

Neo-Keynesian inflation theories have not been real theories of inflation. Money has been tacked onto neo-Keynesian macro models in an unsatisfactory way, with no acceptable microfoundation. Recent neo-Keynesian work on the finance constraint has attempted to provide a better integration of money into the macro model, but in my view, that work will not provide an adequate

basis for a real theory of inflation. In this paper I describe an alternative constraint that provides an adequate basis for a real theory of inflation. I then discuss that theory and show how an understanding of incentive anti-inflation plans follows naturally from it.

## I. Money, the Aggregate Economy, and the Real Theory of Inflation

Money makes the world go 'round. It also makes the economy more efficient. However, since money is not used up in the production process and since it does not directly enter into the production process of a firm, in neoclassical and neo-Keynesian economics it has generally been left out as an argument of the firm's production function. While this simplification may be acceptable on the firm level, it is unacceptable on the aggregate level. The aggregate production function is a description of a composite output of all firms. That composite output is dependent on the trading technology used in the economy, and money plays a central role in that trading technology.<sup>1</sup>

The role of money in the economy is to save resources that otherwise would be used in trading. Money not only facilitates trade; it also allows individuals to more easily store information about relative prices by simply storing a set of nominal prices in their heads, relative to some expectation of other relevant prices. This information is vitally important to a well-functioning economy. The quantity of money available to the economy affects both those price expectations and market conditions. Given a set of individu-

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<sup>1</sup>Jurgen Niehan's (1978) analysis of money in a trading economy provides a formal consideration of the need to include money in a consideration of aggregate equilibrium.

als' nominal price decisions, there can be too little or too much money in the economy. Thus, given the nominal price-setting institutions, the quantity of money available to the economy can directly affect real output. To include this effect, the dichotomy between the real and the nominal sector must be broken, and the quantity of money must be included as a factor of production in the aggregate production function. It is part and parcel of the nominal price-setting institutions.

Introducing money into the production function is not new with me, but most earlier discussions of the role of money in production have focused on money's direct role in production as a medium of exchange. While this direct role may be relevant for certain problems, focusing only on this direct role limits one's understanding of how nominal price-setting institutions can affect the attainable level of output. There is another role of money—its role as a unit of account—that provides an indirect, but important, way in which money can affect the level of output. In my real theory of inflation, the unit-of-account function of money plays a central role.

## II. How the Unit-of-Account Function of Money Can Affect Output

The unit-of-account constraint is straightforward: if money is to serve as a unit of account, it must provide a reasonably stable one. This means that, in a steady-state monetary equilibrium, the expected rate of inflation must equal the actual rate; there cannot be accelerating deflation or accelerating inflation; thus, in steady-state equilibrium the composite of people's nominal price decisions must correspond to a set of relative prices which places no upward or downward pressure on the nominal price level that would make it deviate from the expected rate of inflation. This does not mean that all markets must be in equilibrium; it simply means that people must not expect any bias one way or another in the direction of nominal prices in the average market. Any monetary policy (by which I mean the quantity of money available at

each point in time) must be chosen to be consistent with this unit-of-account constraint.

If expectations are perfectly rational, and if there are no institutional constraints on the nominal price-setting process and the unit of account constraint is not met, the price level will implode or explode instantaneously. The reasoning behind this argument is the standard short-run/long-run Phillips Curve reasoning in which rational expectations transforms the short run into the long run. If the unit-of-account constraint is not met, a leapfrog mentality will infect the nominal price-setting process. In the real world, runaway inflation or deflation would take a bit longer, but if pressures on the nominal price level were not balanced, the unit-of-account function of money will be undermined, and the economy's output will decline. Thus, the unit-of-account constraint must be taken into account in determining the optimal monetary policy.

Given current institutions, the way economies meet this constraint is to choose a monetary policy consistent with an aggregate level of output that meets this constraint. Limiting the quantity of money both anchors price expectations and affects the demand for products. In this way, it anchors the price level and prevents runaway inflation or deflation.<sup>2</sup>

The above argument would, I believe, be quite acceptable to adherents of most monetary theories of inflation if I stopped there. However, I do not; I argue that it is important to recognize that the described effect of the quantity of money on the price level is indirect. Money does not control the price level directly. It affects aggregate nominal demand, which thereby affects individual's price choices and, more importantly, con-

<sup>2</sup>Since expectations are developed by more than what happens to the money supply in a quarter or a year, the monetary regime, rather than the specific quantity of money, is what determines the price level. Should there ever be a moneyless world in which all transactions were simply credit and debit transactions on a computer network, some other type of anchor on price expectations would be needed.

trols individuals' expectations of others' nominal price choices. Since individuals' choice of a relative price is made by choosing a nominal price relative to a set of expectations of others' nominal price, this latter effect is extremely important. The monetary authorities control the price level primarily by controlling expectations, and they back up that control with the threat to provide insufficient money to the economy relative to the nominal prices set by individuals and thereby to disrupt the economy and make all people worse off. Thus, monetary control can meet the unit-of-account constraint, but not necessarily at a level of output that would correspond to "full employment," or its dynamic equivalent, the optimal amount of searching and waiting that could be deduced by thinking about a nonmonetary economy.

To see that this is indeed the case, consider an economy in which nominal price-setters, on average, have a tendency to try to set their relative price slightly above the equilibrium relative price. If they try to do so, the price level will explode. But such an explosion of the price level would destroy the unit of account function of money. In the aggregate it cannot be done. Thus, the existence of such a pressure on the price level is inconsistent with a steady-state equilibrium in a monetary economy. It follows that monetary policy must be chosen to be consistent with an aggregate equilibrium that offsets that tendency.<sup>3</sup>

Elsewhere (Colander, 1981, 1985) I have argued that an upward bias in the nominal price-setting process actually exists in our economy; I will not argue its existence here, since my argument depends only on the existence of a bias in the nominal price-setting process, not on a bias in one direction or another. The existence of a bias means that the economy will not equilibrate at the

dynamic equivalent to a full-employment economy (where excess supplies match excess demands) or at some separately determined desired level of output. It would, instead, equilibrate at a level of output that offsets the price-setting bias.

It would be very strange that either all price-setting individuals would want to set their relative prices at the equilibrium level through some quirk of fate or that seller monopolies would be offset by buyer monopolies. The burden of proof for the nonexistence of a bias should lie with those who argue that a billion-to-one possibility is actually the one that describes the monetary economy.<sup>4</sup>

The reason the above observations are important is that most discussions of a steady-state equilibrium have left it out and have instead related steady-state equilibrium to some type of nonmonetary economy. Doing so misses the important point that the existence of a nominal price-setter bias in one direction or another means that the steady-state equilibrium of a monetary economy must be different than the steady-state equilibrium of a nonmonetary economy. In steady-state equilibrium, some mechanism must offset that bias and meet the unit-of-account constraint.

Let me describe what I mean. Say there is an upward bias in the nominal price-setting process. In steady-state equilibrium, that bias must be offset, which means, on average, markets must be kept in an excess-supply state which creates a downward pressure on nominal prices sufficient to offset that bias. This, I have argued elsewhere (Colander, 1981), is what people had in mind when they argued the existence of a NAIRU rather than a natural rate. If there were significant net upward pressure on

<sup>3</sup>If this tendency did not exist, or if nominal prices were directly held down, aggregate output could be higher. Whether this results in unemployed resources, underutilized resources, or misallocated resources depends upon the nominal price-setting institutional structure.

<sup>4</sup>For those who think there is no bias, I propose the following thought experiment. Create property rights in prices: individuals can change their price only if they buy the right from someone else who changes price in an offsetting direction. What would the price of changing price be? As I argue herein, an answer other than zero implies a nominal price-setting bias. Most economists I have met expect the price to be positive, which implies that they believe there is an upward bias.

nominal wages and prices, the NAIRU could be an output level consistent with 5-, 10-, or even 20-percent unemployment. That high unemployment would create a downward pressure on wages and prices to offset the upward pressure. Thus, monetary policy prevents increasing inflation by increasing the number of markets in excess supply and decreasing the number of markets in excess demand to a sufficient degree to offset any nominal price-setting bias.

### III. Macro Foundations of Micro

The implications of the real theory of inflation are significant, not only for macro theorizing; but also for micro theorizing. Notice what the theory says: steady-state equilibrium in a monetary economy differs from equilibrium in a nonmonetary economy. Since any pressure on the nominal price level must be countered by offsetting pressures created by the average market being maintained in excess supply (if there is upward pressure) or excess demand (if there is downward pressure), in macro equilibrium each individual micro market must make a contribution to that pressure, so *equilibrium in that individual market will be affected by that macro equilibrium*. This means that the equilibrium in a particular market *will not obtain where supply equals demand*, but rather where that market is making its equilibrium marginal contribution to the unit-of-account constraint.

Methodologically, this interdependence means that in analyzing a monetary economy one cannot logically build up from individual-market partial equilibria to an analysis of aggregate equilibrium. It is incorrect to model any individual micro market without first having determined what the macro equilibrium is, because that macro equilibrium will impose constraints on the micro markets. Both equilibria must be considered simultaneously. Thus, any micro foundations of macro must be supplemented by the macro foundations of micro.

One could argue that what I am calling a nonoptimal level of search is actually an individual, not a societal, problem. If people want to set their relative prices too high,

they must naturally search longer than otherwise. That view misses the point; the unit-of-account constraint is a societal constraint, not an individual constraint. There is no institution in the economy that directly coordinates nominal price decisions. The individuals experiencing the extra search and wait are not necessarily the ones who society would determine are inappropriately raising or not lowering their nominal prices or wages and hence necessitating the additional searching required to provide the needed pressure on the nominal price level.<sup>5</sup> Given current institutions, there is no direct coordination of nominal price decisions to see that they are compatible with a consistent set of relative prices.

Consider the following analogy: a stampede to get out of a burning building. If there is a coordinated policy that people follow, all can get out; if there is not, everyone is left to get out on his or her own, and many will die. In a trivial sense, one can say that each death was the dead individual's own doing; given the institutional structure, each person was undertaking the optimal amount of search for ways to get out. People die; that is just the way life is. One could even analyze how individuals could improve search strategies to increase their likelihood of escaping. However, considering the problem through the eyes of the individual misses the point. Individuals optimize *given an institutional structure*. The question about the amount of search an individual, on average, must perform concerns institutional policy, not individual policy. The inefficient search process of the people who die in a fire should not be viewed as the cause of their deaths. Rather, it is the lack of a coordination policy that coordinates the exit.

So it is too with the excess search unemployment and misallocated resources that result from the unit-of-account constraint.

<sup>5</sup>What is appropriate or inappropriate is determined by some outside welfare judgment, as any such consideration must be.

Unemployed individuals' or firms' inefficient search processes should not be viewed as the cause of their unemployment. Rather, it is the lack of a policy that coordinates the nominal price-setting process. The unemployed are no more the cause of their unemployment than the people who died trying to escape the fire are the cause of their own deaths.

#### **IV. Incentive Anti-Inflation Policies and the Real Theory of Inflation**

I now consider the role of an incentive anti-inflation policy in a monetary economy. An incentive anti-inflation policy is any policy that directly coordinates the nominal price-setting decisions of individuals. It is a policy that changes the nominal price-setting institutional characteristics of the economy and hence changes the limitation imposed by the unit-of-account constraint.

The specific incentive anti-inflation plan I want to consider here is MAP, the market anti-inflation plan (Abba Lerner and Colander, 1980). MAP involves the creation of property rights in gross markups which have a direct relationship to prices, so that any price-setter who wants to change his nominal price must contract with another price-setter who will agree to change his nominal price in an offsetting manner. By definition, with MAP in place the nominal price level remains constant. No inflation is possible, and hence no expectation of inflation is possible, since the aggregate nominal price level is set.

Where does a plan such as MAP fit into my real theory of inflation? In my theory, the price level is determined by the quantity of money maintaining output at a level consistent with the nonaccelerating price-level constraint. MAP does not change that relationship, but it does change the nature of the steady-state equilibrium. It does so by coordinating the nominal price-setting decisions so that the net result of the composite decisions of all individuals results in no pressure on the nominal price level. Whereas without MAP the economy equilibrates at, say, 6-percent unemployment, with MAP the unemployment rate at which the

economy equilibrates becomes a policy choice.

In the case when there is an upward bias on the nominal price level, in the absence of MAP, the monetary rule would have to keep the average market in some degree of excess supply, creating a downward pressure on the price level which just offsets the direct upward pressure resulting from that bias. With MAP in place, any direct pressure on the price level will be offset, so the average markets will not need excess supply. The economy can be expanded without causing accelerating inflation.

How much can it be expanded? That depends on what price of MAP credits (price of raising price) the monetary authority is willing to accept. It can set the money supply, and thereby aggregate demand, with a rule contingent on the MAP price since the MAP price measures the inflationary pressure in the economy. A rule that maintains a zero price of MAP credits would be equivalent to a monetary rule with no MAP in place. A positive MAP-credit price would allow there to be more markets with excess demand without accelerating inflation. (A negative MAP-credit price would allow there to be more markets in excess supply without accelerating deflation.) There would be a whole range of alternative steady-state equilibria from which the monetary authorities could choose. The more pressure MAP controls, the higher the steady-state output of the economy. Thus, while there may not be a long-run Phillips-curve trade-off, there is a trade-off between the MAP-credit price and the unemployment rate.

#### **V. Summary and Conclusion**

The central point of the real theory of inflation is that when one specifies the path through which monetary policy controls the price level, the unit-of-account function of money makes nominal price-setting decisions of individuals important. These nominal price-setting decisions change the nature of the aggregate equilibrium of a monetary economy from what would obtain from a nonmonetary economy. Specifically, if there is direct upward pressure on the

price level, the aggregate equilibrium requires that the average market have excess supply.

Incentive anti-inflation plans such as MAP directly offset any upward pressure and thereby change the obtainable equilibrium. Specifically, if there is upward pressure they allow aggregate output to be higher than it otherwise could be. In standard macro terms, they reduce the NAIRU.

What steady-state level of output society desires is debatable; there are costs to higher levels of output, both in the administration of an incentive anti-inflation plan, which is necessary to allow society to achieve that higher output level, and in the reduction of markets in excess supplies. These costs must be compared with the benefits of a reduction in markets in excess supply (and hence increased output) which will occur with the introduction of MAP. I do not know whether MAP or some alternative incentive anti-inflation plan is politically feasible. Elsewhere (Colander, 1981) I have argued that it is practically feasible, but feasibility is not

the concern of this paper. The argument in this paper is that the plans are theoretically interesting, and thinking about them can significantly improve understanding of the aggregate economy.

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