Annals of Economic and Social Measurement, 6/3, 1977

SOCIAL PREFERENCE FUNCTIONS AND THE DICHOTOMY ARGUMENT: A COMMENT

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In his intriguing paper, "On the Specification of Unemployment and Inflation in the Objective Function," Carl Palash observes that "a dichotomy between preferences and constraints is a standard assumption of welfare theory." A straightforward application of this observation requires that any social preference function which is to be maximized should be specified more or less independently of the macroeconomic model which serves as its constraint set.

Unfortunately when Palash applies this independence doctrine in a series of simulations, the resulting optimal policy behavior generates a minor depression. Two explanations are apparent: (i) an independent specification of the social preference function is not always appropriate, and (ii) the basic macroeconomic model used is incomplete. These explanations are considered separately below.

I. THE DICHOTOMY BETWEEN PREFERENCES AND CONSTRAINTS

Palash defines both a *strong* and a *weak* dichotomy between preference functions and the underlying economic model or constraint set. The strong dichotomy requires that the target values for the arguments of the preference function be determined independently of the constraint set. The weak dichotomy requires that these targets be defined by the equilibrium or steady-state levels implied by the underlying economic model.

The strong dichotomy appears to have only a very limited applicability. Consider, for example, a simple two person two commodity world in which each person has an initial endowment of commodity one. In this situation a Pareto optimal allocation can be obtained by maximizing

(1) $$U_1 = U_1(x_{11}, x_{21})$$

subject to

(i) $$U_2 = U_2(x_{12}, x_{22}) = U_2(x_{12}^*, 0) = U_2^*$$

(ii) $$x_2 = x_{21} + x_{22} = f_1(x_1)$$

(iii) $$x_1 = x_{11}^* + x_{12}^* - (x_{11} + x_{12}),$$

where x_{ij} = the quantity of the i^{th} commodity held by the j^{th} consumer,

x^*_{1j} = the initial endowment of the first commodity held by the j^{th} consumer,
$U_i(x_{i1}, x_{i2})$ = the i^{th} consumer's utility function
$x_2 = f_1(x_1)$ = the relevant production function.

The same Pareto optimal allocation obtains from maximizing

$$U_3 = U_1(x_{11}, x_{21}) + \lambda[U_2(x_{12}, x_{22}) - U^*_2]^2 \tag{2}$$

subject to (ii) and (iii) above. An arbitrarily large λ is assumed.

Two insights are immediately apparent. First, since a constraint can frequently be formulated as an argument in the criterion function (and vice versa), any assumption positing strict independence between the two needs to be carefully examined. Secondly, since the two specifications of the problem are equally valid, the second formulation can be analyzed without prejudicing the argument.

Note that the target level U^*_2 of equation (2) is related to the endowment level x^*_{12}. Consequently U^*_2 is not independent of the constraint set (ii) and (iii). The weak dichotomy obtains, however, because choosing a target value less than $U^*_2 = U_2(x^*_{12}, 0)$ can not be consistent with any equilibrating mechanism (market or other), since consumer 2 can always elect to retain his initial endowment x^*_{12}. Note also that an exogenous increase in the endowment to x^{**}_{12} implies a new target value U^{**}_2.

II. Targets and the Inflation—Unemployment Policy Model

In the standard textbook presentation,[1] the policy decision process requires maximizing a social preference function given by

$$U = U(p, u) \tag{3}$$

subject to a modified Phillips curve given by

$$p = p^e + f_2(u^* - u), \tag{iv}$$

or

$$p = w - pr \quad \text{and} \quad w = p^e + pr + f_2(u^* - u),$$

where p = percentage price increase or inflation rate
p^e = expected percentage price increase
w = percentage money wage increase
pr = percentage productivity increase
u = unemployment rate
u^* = targeted unemployment rate.

A strong dichotomy is implied by this formulation of the problem since

[1] See for example, Peacock & Shaw (1971), especially pp. 152–159.

the implicit target values of the preference function are $p^* = u^* = 0$, and these are independent of (iv). The graphical solution to the decision problem is given by point A in figure 1 below. Presumably point A is reached by some suitable combination of monetary and fiscal policy.

A more complete specification of the basic macroeconomic model includes equation (iv) as a reduced form supply side relationship and equation (v) immediately below as a reduced form demand side relationship. This demand relationship is given by

(v) $$p = \alpha f_3(u - u^*) + \beta g + \gamma m + \delta,$$

where g = percentage deviation in government expenditures from its equilibrium level and

m = percentage deviation in money supply from the equilibrium level required to accommodate non-inflationary growth.

Equation (v) itself derives from the following standard equilibrium condition in the commodity and money markets.

$$y = a_0 + a_1 g + a_2 i$$

$$m - p = m_1 y - m_2 i$$

and

$$y = -f_3(u - u^*)$$

where y = percentage deviation from the long run full employment ($u = u^*$) GNP and

i = interest rate deviation

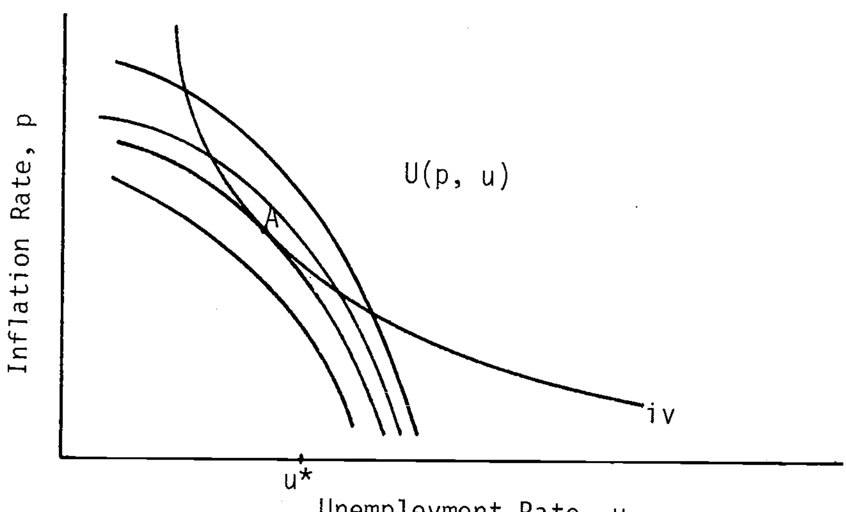

Figure 1

The demand and supply relationships given by (v) and (iv) respectively can be graphed as in figure 2. The equilibrium at point B defines the natural unemployment and inflation rates. The natural unemployment rate u^* represents the level of frictional and structural unemployment which can not be further reduced without *escalating* the rate of inflation above p^*. The non-zero inflation rate p^* obtains in equilibrium because of a heterogeneous labor market, downward wage resistance, the relative wage phenomenon, and other institutional considerations.

There appears to be no logical reason for solution A and the equilibrium solution B to be the same. Solution B is an equilibrium which obtains when all of the agents of the economy (including the government and the central bank) behave in some normal or average manner. This implies that $\delta = g = 0$ and $m = p^e = p$. If, on the other hand, the economic agents in the private sector become pessimistic, aggregate demand is depressed below the level necessary to sustain full employment. Algebraically this can be represented by a negative a_0 and/or δ. This implies a disequilibrium downward shift in (v) to ($\bar{v}$). However, since the demand relationship is parametric with respect to monetary and fiscal policy, these instruments can be used to return ($\bar{v}$) to (v), and restore the full employment equilibrium B. Indeed these same expansionary policies can be pursued even more vigorously to achieve, at least temporarily, solution A.

This brings us to the final relationship of the model. Heretofore, we have assumed that the expected inflation rate is determined exogenously. Clearly this is not a valid equilibrium assumption. In the long run, whether

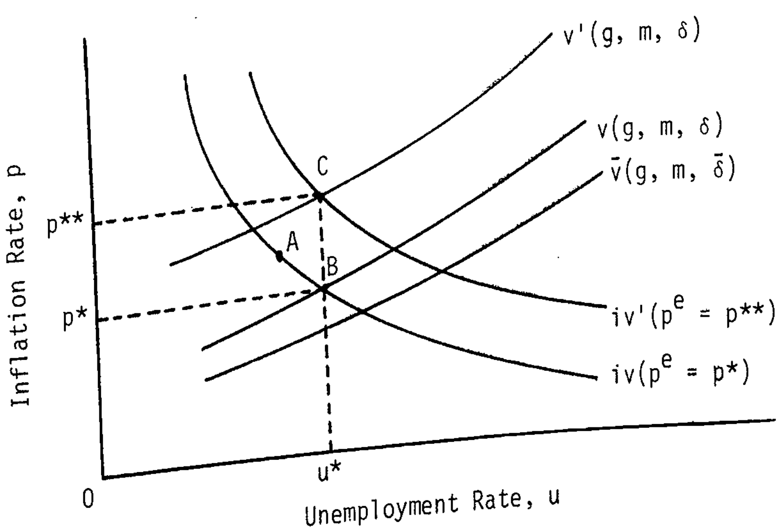

Figure 2

expectations are formed rationally or adaptively, the only viable equilibrium condition is that $p^e = p = p^*$. Since solution A implies an inflation rate $p > p^e = p^*$ which is implicit in (iv), an upward shift in (iv) is implied over the long run.

Conversely if the existing inflationary expectation rate p^e equals $p^{**} > p^*$, the appropriate supply relationship is given by (iv′). Simultaneously since we have defined normal or equilibrium behavior for the central bank as maintaining the target level of real balances, i.e., $m' = p^e = p^{**}$, the appropriate demand relationship is given by (v′). The corresponding equilibrium is C with target values u^* and p^{**}. The condition $p^e = p^{**}$ is not a disequilibrium phenomenon (as is, e.g., a depressed value of δ) because there *exists no inherent market pressure to return* p^e *to* p^*. Furthermore since fiscal and monetary policies are essentially demand oriented, neither policy exerts any direct influence on the supply relationship (iv′). In this situation the target set (p^*, u^*) is appropriate in the short run only if one is willing to consider an incomes policy whose primary objective is to decrease inflationary expectations, and therefore shift (iv′) back to (iv); otherwise the appropriate target set is (p^{**}, u^*).

In the very long run (p^*, u^*) may be a legitimate target set, but only if one is willing to employ restrictive monetary and fiscal policies long enough to alter inflationary expectations. In this case however a very long planning horizon is required.

It should be evident from the above discussion that the strong dichotomy argument is never appropriate, and that the targets defined by the weak dichotomy argument must always be stated in terms of the inherent equilibrating mechanism of the system. Long run or historical norms are not necessarily good proxies for targets defined in this way.

IV. Some Problems

In his optimization studies Palash uses the rather detailed MPS model as his constraint set. For much of the period 1971–75, a plausible analog to this MPS model is the system given by the set of equations (iv′) and (v′) in figure 2. As shown immediately above in this case the target set appropriate to the social preference function is (p^{**}, u^*). Since Palash uses the target sets $(0, 0)$ and (p^*, u^*), it is not surprising that his simulation results have little intuitive appeal. If the *implicit* expectation relationship in the MPS model had a shorter lag structure or if an incomes policy had been entertained, the target set (p^*, u^*) would have yielded more satisfactory results.

It is incorrect to conclude that the dichotomy problem is entirely responsible for the "unacceptable" depression indicated in Palash's simulations. Two other sources can be readily identified. First, Palash, chose to arbitrarily constrain the Treasury bill rate and federal non-defense non-wage expenditures. A more satisfactory solution would have obtained had he instead chosen to penalize the deviation of these policy variables from some target level. Of much greater significance, however, is the fact that the MPS model does not differentiate sufficiently between fixed and flexible price sectors. This distinction is critically important for the period studied. If the MPS model had been disaggregated along these lines Palash could have used the inflation rates in the fixed and flexible price sectors as separate arguments in his preference function. Since inflation in the flexible price sector is more short-lived and also provides a substantial incentive toward efficient allocation, the penalty associated with non-targeted inflation rates in this sector should be fairly light. This modification would have significantly dampened the more restrictive policy measures indicated in Palash's simulations.

Finally we note that Palash correctly identifies the potential for symmetric preference functions (such as the quadratic form) to bias policy behavior. If the appropriate target set is employed this potential is minimized. In some cases little or no bias is introduced. If, e.g., a quadratic criterion function is used, this would imply a preference function consisting of concentric elipses about point C in figure 2. In this event a bias is introduced whenever $p < p^{**}$ or $u < u^{*}$. However, given the shape of (iv′) this event does not appear to be very probable. Nonetheless symmetric specifications in the preference function constitute a problem which warrants considerable additional study.

References

[1] C. Palash, "On the Specification of Unemployment and Inflation in the Objective Function," *Annals Economic and Social Measurement*, this issue.

[2] A. Peacock and G. Shaw, *The Economic Theory of Fiscal Policy*, Allen and Unwin (1971).

[3] T. J. Sargent and N. Wallace, "Rational Expectations and the Theory of Economic Policy," *Journal Monetary Economics 2* 169(1976).

[4] F. R. Shupp, "Optimal Policy Rules for a Temporary Incomes Policy," *Review Economic Studies 43* 249(1976).

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