CLASSICAL AND KEYNESIAN FEATURES IN MACROECONOMIC MODELS WITH IMPERFECT COMPETITION

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A B S T R A C T

For more than fifty years now the two main (and competing) paradigms in macroeconomics have been the Keynesian and Classical ones. Since about twenty years a new paradigm, imperfect competition macroeconomics, has emerged, which avoids the main shortcomings of the two earlier ones. We investigate in this article whether the models in this line of work have more Keynesian or Classical properties. For that purpose we construct a simple ptototype macroeconomic model with imperfect competition and rational expectations, and study its properties. We find notably that the equilibria of this model have inefficiency properties very similar to those of Keynesian models. The economy, however, reacts to monetary and fiscal policies in a very "classical" manner. Finally normative prescriptions are neither Keynesian nor classical.

Keywords : Macroeconomics, Imperfect Competition, Classical, Keynesian.

Journal of Economic Literature Classification Numbers : E, D5.

LES MODELES MACROECONOMIQUES DE CONCURRENCE IMPARFAITE

ONT-ILS DES CARACTERISTIQUES CLASSIQUES OU KEYNESIENNES ?

R E S U M E

Depuis une cinquantaine d'années le débat macroéconomique est dominé par l'affrontement entre "Classiques" et "Keynésiens". Or depuis une vingtaine d'années a émergé un nouveau paradigme, la macroéconomie de la concurrence imparfaite, qui évite les défauts les plus criants des deux écoles ci-dessus. On se demande dans cet article si les modèles de ce tye ont des propriétés classiques, Keynésiennes, ou autres. Pour répondre à cette question on construit un modèle macroéconomique "prototype" avec concurrence imparfaite et anticipations rationnelles, et on en étudie les propriétés. On trouve notamment que les équilibres du modèle ont des propriétés d'inefficacité extrêmement semblables à celles des modèles Keynésiens. Par contre la réponse de l'économie à des politiques monétaires ou fiscales est de nature beaucoup plus "classique". Quant aux prescriptions "normatives" de politique économique, elles ne sont ni classiques, ni Keynésiennes.

Mots Clefs : Macroéconomie, Concurrence Imparfaite, Classiques, Keynésiens.

Codes J.E.L. : E, D5.

1. INTRODUCTION (*)

Recent years have seen a rapidly growing development of macroeconomic models based on imperfect competition. A strong point of these models is that they are able to generate inefficient macroeconomic equilibria, obviously an important characteristic nowadays, while maintaining rigorous microfoundations. Indeed in these models both price and quantity decisions are made rationally by maximizing agents internal to the system, which thus differentiates them from Keynesian models, where the price formation process is a priori given, and also from classical (i.e Walrasian) models, where the job of price-making is left to the implicit auctioneer.

Since for many years the macroeconomic debate has been dominated by the "classical vs. Keynesian" opposition, a question often asked by various authors, inside and outside the domain, is whether these macroeconomic models with imperfect competition have more "classical" or "Keynesian" properties. The debate on this issue has sometimes become a bit muddled and the purpose of this paper is to give a few basic answers in a simple and pedagogic way. This we shall do not by reviewing all contributions to the subject (there are already two excellent review articles by Dixon and Rankin, 1994, and Silvestre, 1993), but by constructing a simple "prototype" model with rigorous microfoundations, including notably rational expectations and objective demand curves, and examining how its various properties relate to those of Keynesian and classical models. Before that we shall make a very quick historical sketch of how these models developed in relation to the two above strands of literature.

A brief history

The initial results derived from macro-models with imperfect competition had a distinct Keynesian flavor, maybe because the first models started from the desire to give rigorous microfoundations to models

(*) I wish to thank Huw Dixon and Neil Rankin for their comments on a first version of this paper. Of course the usual disclaimer fully applies here.

generating underemployment of resources. Negishi (1977) showed how under kinked demand curves some Keynesian-type equilibria could be supported as imperfect competition equilibria. Benassy (1977) showed that non-Walrasian fixprice allocations could be generated as imperfect competition equilibria with explicit price setters. It was shown in particular that generalized excess supply states of Keynesian type, with all ensuing inefficiency properties, would obtain if firms were setting the prices and workers the wages.

Policy considerations were brought in by Hart (1982) who constructed a Cournotian model with objective demand curves, which displayed "Keynesian" responses to some policy experiments. These intriguing Keynesian results stirred much interest in the field, but soon after researchers began to realize that the most "Keynesian" policy results were due to somewhat specific assumptions, and the next generation of papers showed that policy responses were of a much more "classical" nature : Snower (1983) and Dixon (1987) showed that fiscal policies had crowding out effects fairly similar to those arising in classical Walrasian models. Benassy (1987), Blanchard-Kiyotaki (1987), Dixon (1987) showed that money had the same neutrality properties as in Walrasian models. Although normative policies were seen to differ from classical ones (Benassy 1991a,b), we shall see below that this was not in a Keynesian manner.

As of now the common wisdom, (although not a unanimously shared one) seems to be that standard imperfect competition models generate outcomes which display inefficiency properties of a "Keynesian" nature, but react to policy in a more "classical" way. If one wants to obtain less "classical" results, one has to add other "imperfections" than imperfect competition, such as imperfect information or costly price changes, to quote only a few. Since the initial venture by Hart in this direction, many different models have been proposed. Because space is scarce and opinions as to which is the most relevant imperfection are highly divergent, we shall not deal at all with these issues, which are aptly surveyed in Dixon and Rankin (1994),Silvestre (1993), and turn to the description of our simple prototype model and its properties, which will confirm and expand the "common wisdom" briefly outlined above.

2. THE MODEL

In order to have a simple intertemporal structure, we shall study in this article an overlapping generations model with fiat money. Agents in the economy are households living two periods each and indexed by $i = 1,\dots,n$, firms indexed by $j = 1,\dots,n$, and the government [1].

There are three types of goods : money which is the numéraire, medium of exchange and unique store of value, different types of labour, indexed by $i = 1,\dots,n$, and consumption goods indexed by $j = 1,\dots,n$. Household i is the only one to supply labor of type i, and sets its money wage w_i. Firm j is the only one to produce good j and sets its price p_j. We shall denote by P and W the price and wage vectors :

$$P = \{p_j | j = 1,\dots,n\}$$

$$W = \{w_i | i = 1,\dots,n\}$$

Firm j produces output y_j using quantities of labour ℓ_{ij} , $i = 1,\dots,n$ under the production function :

$$y_j = F(\ell_j) \tag{1}$$

where F is strictly concave and ℓ_j, a scalar, is deduced from the ℓ_{ij}'s via an aggregator function Λ :

$$\ell_j = \Lambda(\ell_{ij},\dots,\ell_{nj}) \tag{2}$$

We shall assume that Λ is symmetric and homogeneous of degree one in its arguments. Although all developments that follow will be valid with general aggregator functions (see the appendix) we shall use in the main text in order to simplify the exposition the traditional C.E.S. one [2] :

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[1] Of course all concepts that follow would be valid with a different number of households and firms, but using the same number n will simplify notations at a later stage.

[2] These were initially introduced in the macrosetting by Weitzman (1985).

$$\Lambda(\ell_{1j},\dots,\ell_{nj}) = n\left(\frac{1}{n}\sum_{i=1}^{n}\ell_{ij}^{\frac{\varepsilon-1}{\varepsilon}}\right)^{\frac{\varepsilon}{\varepsilon-1}} \tag{3}$$

We may already note that to this aggregator function is naturally associated by duality theory an aggregate wage index w :

$$w = \left(\frac{1}{n}\sum_{i=1}^{n} w_i^{1-\varepsilon}\right)^{\frac{1}{1-\varepsilon}} \tag{4}$$

Firm j's objective is to maximize profits :

$$\pi_j = p_j\, y_j - \sum_{i=1}^{n} w_i\, \ell_{ij}$$

Household i consumes quantities c_{ij} and c'_{ij} of good j during the first and second period of his life, and receives from the government an amount g_{ij} of good j in the first period. Also in the first period household i sets the wage w_i and works a total quantity ℓ_i given by :

$$\ell_i = \sum_{j=1}^{n}\ell_{ij} \le \ell_0 \tag{5}$$

where ℓ_0 is each household's endowment of labor. Household i maximizes the utility function :

$$U(c_i, c'_i, \ell_0 - \ell_i, g_i) \tag{6}$$

where c_i, c'_i and g_i are scalar indexes given by :

$$c_i = V(c_{i1},\dots,c_{in}) \tag{7}$$

$$c'_i = V(c'_{i1},\dots,c'_{in}) \tag{8}$$

$$g_i = V(g_{i1},\dots,g_{in}) \tag{9}$$

We assume that the function V is symmetric and homogeneous of degree one in its arguments. We may note that we use the same aggregator function for private and government spending so that our results will not depend, for example, on the difference between elasticities of the corresponding functions. Again for simplicity of the exposition we shall use in the main text the traditional C.E.S. aggregator :

$$V(c_{i1},\dots,c_{in}) = n\left(\frac{1}{n}\sum_{j=1}^{n} c_{ij}^{\frac{\eta-1}{\eta}}\right)^{\frac{\eta}{\eta-1}} \tag{10}$$

to which is associated by duality the aggregate price index p :

$$p = \left(\frac{1}{n}\sum_{j=1}^{n} p_j^{1-\eta}\right)^{\frac{1}{1-\eta}} \tag{11}$$

We shall assume that U is strictly concave and separable in (c_i,c'_i), $\ell_0 - \ell_i$ and g_i. We shall further assume that the isoutility curves in (c_i,c'_i) plane are homothetic and that the disutility of work becomes so high near ℓ_0 that constraint (5) is never binding. Household i has two budget constraints, one for each period of his life :

$$\sum_{j=1}^{n} p_j\ c_{ij} + m_i = w_i\ \ell_i + \pi_i - p\tau_i \tag{12}$$

$$\sum_{j=1}^{n} p'_j\ c'_{ij} = m_i \tag{13}$$

where m_i is the quantity of money transferred to the second period as savings, p'_j is the price of good j in this future period, τ_i is taxes paid to the government in real terms and π_i household i's profit income, equal to :

$$\pi_i = \frac{1}{n}\sum_{j=1}^{n} \pi_j \tag{14}$$

The government purchases goods on the market and gives quantities g_{ij}, $j = 1,\dots,n$ to household i, allowing him to reach a satisfaction index g_i given by (9) above. He also taxes τ_i from household i, and we assume at this stage that these taxes are lump sum, in order not to add any distortion to the imperfect competition one.

Finally we shall denote by $\bar{m}_i$ the quantity of money that old household i owns at the outset of the period studied (which corresponds of course to his savings of the period just before).

Because the model so far is fully symmetric, we shall further assume :

$$g_i = g \qquad \tau_i = \tau \qquad \bar{m}_i = \bar{m} \qquad \forall\ i \tag{15}$$

3. THE IMPERFECT COMPETITION EQUILIBRIUM

As we indicated above, firm j sets price p_j, young household i sets the wage w_i. Each does so taking all other prices and wages as given. The equilibrium is thus a Nash equilibrium in prices and wages. A central element in the construction of this equilibrium is the set of objective demand curves faced by price and wage setters, to which we now turn.

3.1. Objective demand curves

Deriving rigorously objective demand curves in such a setting requires obviously a general equilibrium argument (Benassy, 1988, 1990). Calculations, which are carried out in the appendix, show that the objective demands for good j and labour i respectively are given by :

$$Y_j = \left(\frac{p_j}{p} \right)^{-\eta} \frac{1}{1-\gamma} \left[\frac{\bar{m}}{p} + g - \gamma\tau \right] \tag{16}$$

$$L_i = \left(\frac{w_i}{w} \right)^{-\varepsilon} \frac{1}{n} \sum_{j=1}^{n} F^{-1}(Y_j) \tag{17}$$

where $\gamma = \gamma(p'/p)$ is the propensity to consume out of current income and p' is tomorrow's price index. As an example, if the subutility in (c_i, c'_i) is of the form α Log c_i + $(1-\alpha)$ Log c'_i (which we shall use below), then $\gamma(p'/p) = \alpha$.

To make notation a little more compact, we shall denote functionally the above objective demand functions as :

$$Y_j = Y_j(P,W,\bar{m},g,\tau,p') \tag{18}$$

$$L_i = L_i(P,W,\bar{m},g,\tau,p') \tag{19}$$

We should note for what follows that these functions are homogeneous of degree zero in $P,W,\bar{m}$ and p'.

3.2. Optimal plans

Consider first firm j. To determine its optimal plan, and notably the price p_j it will set, it will solve the following program (A_j) :

$$\text{Maximize } p_j\, y_j - \sum_{i=1}^{n} w_i\, \ell_{ij} \qquad \text{s.t.}$$

$$\left.\begin{array}{l} y_j = F(\ell_j) \\ y_j \le Y_j(P,W,\bar{m},g,\tau,p') \end{array}\right\} \qquad (A_j)$$

We shall assume that this program has a unique solution, which thus yields the optimal price as :

$$p_j = \psi_j(P_{-j},W,\bar{m},g,\tau,p') \tag{20}$$

where $P_{-j} = \{p_k | k \ne j\}$

Consider now young household i. His optimal plan, and notably the wage w_i it will set, will be given by the following program (A_i) :

$$\text{Maximise } U_i(c_i,c'_i,\ell_0 - \ell_i,g_i) \qquad \text{s.t.}$$

$$\sum_{j=1}^{n} p_j\, c_{ij} + \sum_{j=1}^{n} p'_j\, c'_{ij} = w_i\, \ell_i + \pi_i - p\tau$$

$$\ell_i \le L_i(P,W,\bar{m},g,\tau,p')$$

which, assuming again a unique solution, yields the optimal wage w_i :

$$w_i = \psi_i(W_{-i},P,\bar{m},g,\tau,p') \tag{21}$$

where $W_{-i} = \{w_k | k \neq i\}$.

3.3. Equilibrium

We can now define our imperfect competition equilibrium as a Nash equilibrium in prices and wages :

Definition : An equilibrium is characterized by prices and wages p^*_j and w^*_i such that :

$$w^*_i = \psi_i(W^*_{-i}, P^*, \bar{m}, g, \tau, p') \qquad i = 1, \ldots, n$$

$$p^*_j = \psi_j(P^*_{-j}, W^*, \bar{m}, g, \tau, p') \qquad j = 1, \ldots, n$$

All quantities in this equilibrium are those corresponding to the fixprice equilibrium associated to P* and W*. Alternatively they are also given by the solutions to programs (A_i) and (A_j) in subsection 3.2, replacing P and W by their equilibrium values P* and W*.

4. CHARACTERIZATION AND EXAMPLE

We shall assume that the equilibrium is unique. It is thus symmetric, in view of all the symmetry assumptions made. We shall have :

$$\ell_j = \ell \qquad y_j = y \qquad p_j = p \qquad \forall j$$

$$\ell_i = \ell \qquad c_i = c \qquad c'_i = c' \qquad g_i = g \qquad w_i = w \qquad \forall i$$

$$\ell_{ij} = \frac{\ell}{n} \qquad c_{ij} = \frac{c}{n} \qquad c'_{ij} = \frac{c'}{n} \qquad g_{ij} = \frac{g}{n} \qquad \forall i, j$$

Before studying the properties of our equilibrium, we shall derive a set of equations characterizing it, and give an example.

4.1. Characterizing the equilibrium

In order to derive the equations determining the imperfectly competitive equilibrium, we shall first use the optimality conditions corresponding to the above optimization programs of firms and households.

Consider first the program (A_j) of a representative firm j. At a symmetric point the Kuhn-Tucker conditions yield (recall that the objective demand curve has, assuming n is large, an elasticity of $-\eta$) :

$$\frac{w}{p} = \left(1 - \frac{1}{\eta}\right) F'(\ell) \tag{22}$$

and the production function :

$$y = F(\ell) \tag{23}$$

Consider similarly the program (A_i) of a young representative household. At the symmetric equilibrium, calling λ the marginal utility of income, the Kuhn-Tucker conditions yield :

$$\frac{\partial U}{\partial c} = \lambda p \qquad \frac{\partial U}{\partial c'} = \lambda p' \tag{24}$$

$$\frac{\partial U}{\partial(\ell_0 - \ell)} = \lambda w\left(1 - \frac{1}{\varepsilon}\right) \tag{25}$$

and the budget constraint of this young household is written :

$$pc + p'c' = w\ell + \pi - p\tau = p(y-\tau) \tag{26}$$

We finally have the physical balance equation on the goods market :

$$c + c' + g = y \tag{27}$$

and the budget constraint of the representative old household :

$$pc' = \bar{m} \tag{28}$$

Equations (22) to (28) describe the equilibrium. Before moving to the various properties of this equilibrium, we shall give a simple illustrative example.

4.2. An example

We shall now fully compute the equilibrium for the following Cobb-Douglas utility function :

$$U = \alpha \text{ Log } c + (1-\alpha) \text{ Log } c' + \beta \text{ Log } (\ell_0 - \ell) + v(g) \qquad (29)$$

Solving first equations (24) to (26) we obtain the following relation characterizing the quantity of labor supplied by the young household :

$$\frac{w}{p}(\ell_0 - \ell) = \frac{\varepsilon}{\varepsilon-1} \cdot \beta(y - \tau) \qquad (30)$$

which together with equations (22) and (23) allows to compute the equilibrium quantity of labor ℓ :

$$F'(\ell)(\ell_0 - \ell) = \frac{\varepsilon}{\varepsilon-1} \cdot \frac{\eta}{\eta-1} \beta[F(\ell) - \tau] \qquad (31)$$

Once ℓ is known, all other values are easily deduced from it :

$$y = F(\ell) \qquad (32)$$

$$\frac{w}{p} = \frac{\eta-1}{\eta} F'(\ell) \qquad (33)$$

$$c = \alpha(y - \tau) \qquad (34)$$

$$c' = (1-\alpha) y + \alpha\tau - g \qquad (35)$$

$$p = \frac{\bar{m}}{(1-\alpha)y + \alpha\tau - g} \qquad (36)$$

5. KEYNESIAN INEFFICIENCIES

Quite evidently the equilibrium obtained above is not a Pareto optimum, but we shall now further see that the nature of the allocation and its inefficiency properties look very much like those encountered in traditional Keynesian equilibria.

The first common point is that we indeed observe at our equilibrium a potential excess supply of both goods and labor. Equation (22) shows that marginal cost is strictly below price for every firm, and thus that firms would be willing to produce and sell more at the equilibrium price and wage, provided the demand was forthcoming. Similarly equation (25) shows that the households would be willing to sell more labour at the given price and wage, if there was extra demand for it. We are thus, in terms of the terminology of fixprice equilibria, in the general excess supply zone.

Secondly equations (16) and (17) which yield the levels of output and employment for given prices and wages are extremely similar to those of a traditional Keynesian fixprice-fixwage model. In fact equations (16) and (17) are a multisector generalization of the traditional one-sector Keynesian equations. Let us indeed take all prices equal to p, all wages equal to w. We obtain immediately :

$$y_j = \frac{1}{1-\gamma}\left[\frac{\bar{m}}{p} + g - \gamma\tau\right] = y \qquad \forall\, j$$

$$\ell_i = F^{-1}(y) \qquad \forall\, i$$

A most traditional "Keynesian multiplier" formula.

We shall finally see that our equilibrium has a strong inefficiency property which is characteristic of multiplier equilibria (see for example Benassy 1977, 1990), namely that it is possible to find additional transactions which, at the given prices and wages, will increase all firms' profits and all consumers's utilities.

To be more precise let us assume that all young households work an extra amount $d\ell$, equally shared between all firms. The extra productions are shared equally between all young households so that each one sees its current consumption index increase by :

$$dc = dy = F'(\ell)\, d\ell \qquad (37)$$

Considering first the representative firm, we see, using equation (22), that its profits in real terms will increase by :

$$d(\pi/p) = \frac{F'(\ell)\ d\ell}{\eta} > 0 \tag{38}$$

Consider now the representative young household. The net increment in his utility is :

$$dU = \frac{\partial U}{\partial c}\cdot dc + \frac{\partial U}{\partial \ell}\cdot d\ell$$

which, using equations (22), (24) and (25) yields :

$$dU = \left[1 - \left(1 - \frac{1}{\eta}\right)\left(1 - \frac{1}{\varepsilon}\right)\right] \frac{\partial U}{\partial c} F'(\ell)\ d\ell > 0 \tag{39}$$

Equations (38) and (39) show that the increment in activity leads clearly to a Pareto improvement.

All the above characterizations point to the same direction : At our equilibrium activity is blocked at too low a level, and it would be desirable to implement policies which do increase this level of activity. The traditional Keynesian prescription would be to use expansionary demand policies, such as monetary or fiscal expansions. Equations (16) and (17) show us that, if prices and wages remained fixed, these expansionary policies would indeed be successful in increasing output and employment. But, and this is where resemblance with Keynesian theory stops, governement policies will bring about price and wage changes which will completely change their impact. To this we shall now turn.

6. THE IMPACT OF GOVERNMENT POLICIES

We shall now study the impact of two traditional Keynesian expansionary policies, monetary and fiscal policies, and show that, because of the price and wage movements which they induce, they will have "classical" effects quite similar to those which would occur in the corresponding Walrasian model. One may have a quick intuitive understanding of such results by looking at equations (22) - (28) defining the equilibrium, and noticing that the corresponding Walrasian equilibrium would be defined by exactly the same equations, with ε and η both infinite.

The similarity of the first order conditions explains why policy responses will be similar.

6.1. The neutrality of monetary policy

We shall now consider a first type of expansionary policy, a proportional expansion of the money stock which is multiplied by a quantity $\mu > 1$. This is implemented here by endowing all old households with a quantity of money $\mu\bar{m}$ instead of $\bar{m}$. Although the analysis of this case may seem fully trivial at first sight in view of the homogeneity properties of the various functions, one must realize that all equilibrium values in the current period depend not only on the current government policy parameters $\bar{m}$, g and τ, but also on p', the future level of prices, and therefore on all future policy actions as well. To keep things simple at this stage, we shall assume that the government will maintain constant fiscal policy parameters g and τ through time, and that the economy settles in a stationary state with constant real variables and inflation. In that case we have the following relation between p and p':

$$\frac{p'}{p} = \frac{c' + g - \tau}{c'} \tag{40}$$

Combining (22) - (28) and (40), we find that an expansion of $\bar{m}$ by a factor μ will multiply p, w and p' by the same factor μ, leaving all quantities unchanged. Money is thus neutral, as it would be in the corresponding Walrasian model.

6.2. Fiscal policy and crowding out

We shall now study the effects of other traditional Keynesian policies, i.e. government spending g and taxes τ. In order to avoid complexities arising when the current equilibrium depends on future prices, we shall make our discussion in the case of the example discussed in section 4.2. where the current equilibrium depends only on current policies.

Although formulas (31) to (36) allow to deal with the unbalanced budget case as well, we shall concentrate here on balanced budget policies

$g = \tau$, which have been the most studied in the literature. Let us recall equation (31) giving the equilibrium level of employment :

$$F'(\ell)(\ell_0 - \ell) = \frac{\varepsilon}{\varepsilon-1} \cdot \frac{\eta}{\eta-1} \beta[F(\ell) - \tau] \qquad (31)$$

Taking $\tau = g$ and differentiating it we obtain :

$$\frac{\partial y}{\partial g} < 1 \qquad (41)$$

$$\frac{\partial y}{\partial g} > 0 \qquad (42)$$

Result (41) indicates that the balanced budget multiplier is smaller than one, and therefore that there is crowding out of private consumption, just as in Walrasian models.

Result (42) has been the source of much confusion, leading some authors to believe that they had found there some underpinnings to the "Keynesian cross" multiplier (see for example Mankiw, 1988). Clearly the mechanism at work here has nothing to do with a Keynesian demand multiplier, but goes through the labor supply behavior of the household : Paying taxes to finance government spending makes the household poorer, and since leisure is a normal good here, the income effect will naturally lead the household, other things being equal, to work more, thus increasing activity. We should note that this effect would be present as well in the Walrasian model and is thus fully "classical", as was pointed out early by Dixon (1987).

We should at this point also mention that, whereas the "crowding-out" result (41) is fairly robust, the output expansion one (42) is much more fragile, and depends in particular very much on the method of taxation, as was shown notably by Molana and Moutos (1992). Indeed let us assume, using the same model as in section 4.2., that taxes are not levied in a lump sum fashion, but proportionally to all incomes (profits or wages). In that case it is easy to compute that equation (31) becomes :

$$F'(\ell)(\ell_0 - \ell) = \frac{\varepsilon}{\varepsilon-1} \cdot \frac{\eta}{\eta-1} \beta F(\ell) \tag{43}$$

all other equations remaining the same. In such a case employment and output are totally unaffected by the level of taxes and government spending, and there is hundred percent crowding out. The reason is intuitively simple : While the income effect of taxes still continues to induce a higher amount of work, inversely the proportional taxation of labor income discourages work. In this particular instance the two effects cancel exactly.

7. NORMATIVE RULES FOR GOVERNMENT POLICY

We have just seen that in general fiscal policy was effective in changing employment, output and private consumption, in a way somewhat similar to what would occur in a Walrasian setting. So a question which one is naturally led to ask is : What should be the normative rules for government fiscal policy ? Should they mimick the rules which would be derived in a comparable Walrasian model, or should they be "biased" in a Keynesian manner, say by increasing government spending or reducing taxes ? We shall now study this problem, beginning with the derivation, as a benchmark, of the "classical" prescriptions.

7.1. Classical normative policy

The "classical" policy prescription is most easily obtained by computing the "stationary first best" state of our economy. This will be obtained through maximization of the representative consumer's utility subject to the global feasibility constraint, i.e. :

$$\text{Maximize } U(c, c', \ell_0 - \ell, g) \qquad \text{s.t.}$$

$$c + c' + g = F(\ell)$$

which yields the conditions :

$$\frac{\partial U}{\partial c} = \frac{\partial U}{\partial c'} = \frac{\partial U}{\partial g} = \frac{1}{F'(\ell)} \frac{\partial U}{\partial(\ell_0 - \ell)} \tag{44}$$

It is easy to verify that this first-best solution can be obtained as a stationary Walrasian equilibrium, corresponding to equations (22) to (28) taking both $1/\varepsilon$ and $1/\eta$ equal to zero, provided the government adopts the following rules :

$$g = \tau \tag{45}$$

$$\frac{\partial U}{\partial g} = \frac{\partial U}{\partial c} \tag{46}$$

Equation (45) simply tells us that the government's budget should be balanced. Equation (46) tells us that the government should push public spending to the point where its marginal utility is equal to that of private consumption. In other words the governement should act as a "veil" and pick exactly the level of g the household would have chosen if he was not taxed and could purchase directly government goods.

7.2. Normative policy under imperfect competition

We shall now derive the optimal rule for the government under imperfect competition. In order to simplify analysis, we shall study only the balanced budget case $g = \tau$ [3]. In that case prices are constant in time and equations (22) - (28) simplify to :

$$\frac{w}{p} = \left(1 - \frac{1}{\eta}\right) F'(\ell) \tag{47}$$

$$\frac{\partial U}{\partial c} = \lambda p \qquad \frac{\partial U}{\partial c'} = \lambda p \tag{48}$$

$$\frac{\partial U}{\partial(\ell_0 - \ell)} = \lambda w\left(1 - \frac{1}{\varepsilon}\right) \tag{49}$$

$$c + c' + g = y = F(\ell) \tag{50}$$

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[3] The case of an unbalanced budget $g \neq \tau$ is studied in Benassy (1991b).

All equilibrium values depend on the level of g chosen by the governement. To find its optimal value, let us differentiate $U(c,c', \ell_0-\ell,g)$ with respect to g :

$$\frac{\partial U}{\partial c} \cdot \frac{\partial c}{\partial g} + \frac{\partial U}{\partial c'} \cdot \frac{\partial c'}{\partial g} + \frac{\partial U}{\partial \ell} \cdot \frac{\partial \ell}{\partial g} + \frac{\partial U}{\partial g} = 0 \tag{51}$$

Differentiating also (50) with respect to g we obtain :

$$\frac{\partial c}{\partial g} + \frac{\partial c'}{\partial g} + 1 = F'(\ell) \frac{\partial \ell}{\partial g} \tag{52}$$

Combining (47), (48), (49), (51) and (52) we finally obtain :

$$\frac{\partial U}{\partial g} = \frac{\partial U}{\partial c} \left[1 - \left(\frac{\varepsilon + \eta - 1}{\varepsilon \eta} \right) F'(\ell) \frac{\partial \ell}{\partial g} \right] \tag{53}$$

We see that there will be a systematic bias with respect to the first best rule (46) : If $\partial\ell/\partial g > 0$, as soon as there is market power (that is, if either ε or η is not infinite), the government will be led to push its spending beyond the level that the consumer would freely choose. The converse result will hold if $\partial\ell/\partial g < 0$.

Another way to view this result is to imagine that we start from the level of g that the consumer would have freely chosen. That level of g is characterized by adding the following equation to equations (47) to (50) describing the imperfectly competitive equilibrium :

$$\frac{\partial U}{\partial g} = \frac{\partial U}{\partial c} = \lambda p \tag{54}$$

Let us consider now, starting from this level, a small increase in public spending dg, financed by supplementary taxes $d\tau = dg$, and let us compute the resulting utility increase :

$$dU = \left[\frac{\partial U}{\partial c} \cdot \frac{\partial c}{\partial g} + \frac{\partial U}{\partial c'} \cdot \frac{\partial c'}{\partial g} + \frac{\partial U}{\partial \ell} \cdot \frac{\partial \ell}{\partial g} + \frac{\partial U}{\partial g} \right] dg \tag{55}$$

Using (47), (48), (49), (52) and (54), we obtain :

$$dU = \frac{\partial U}{\partial c} \left[\left(\frac{\varepsilon + \eta - 1}{\varepsilon\eta} \right) F'(\ell) \frac{\partial \ell}{\partial g} \right] dg \tag{56}$$

This shows that, as compared with the first best rule, the government should systematically bias its spending so as to increase the level of economic activity. The intuition is straightforward : Because of imperfect competition on the goods and labour markets the level of activity is inefficiently low, as we saw before. When choosing its level of spending, the government should not only take into account the direct effect on the household's utility (which would yield the "first-best" rule $\partial U/\partial g = \partial U/\partial c$), but should also take into account the indirect utility gains which derive from the positive effect of its macroeconomic policy on activity. This "second best" policy prescription is thus different from the "first best" classical one.

Should one however believe that the normative policy is biased in a "Keynesian" manner ? This is not the case, at least for two reasons. First, even when $\partial\ell/\partial g$ is positive, what leads to the activity increase is not government spending per se via a "Keynesian" demand multiplier, but rather the taxes levied to finance them via a "classical" labor supply effect. Normative analysis would then somehow call for higher taxes, hardly a Keynesian prescription. Secondly, the magnitude and even the sign of $\partial\ell/\partial g$ depend enormously on the method of taxation, making the direction of the bias extremely difficult to assess. Using again the example of section 4.2., under proportional taxation the government should use exactly the "classical" prescription. So whatever bias exists in the normative prescriptions, it is definitely not of a Keynesian type.

8. CONCLUSIONS

We constructed in this paper a simple prototype model of imperfect competition with rational expectations and objective demand curves, studied its various properties, and compared them with those of the basic "Classical" and "Keynesian" models.

We may first note that this model of imperfect competition clearly generalizes the corresponding Walrasian one, which can be obtained as a limit case by making the parameters η and ε go to infinity.

As for the "positive" properties of the model, we saw that they stand somehow halfway between the Keynesian and classical ones : The inefficiency properties very much resemble those of a Keynesian fixprice-fixwage model. On the other hand the response to government policy, fiscal or monetary, is very much of a "classical" nature.

Very important are also the normative implications of such models for government action, and we saw that they were neither Keynesian nor classical. Moreover simple variations on the above model show that they will depend crucially on the nature of rigidities in the price system. Quite urgent in the agenda is thus to develop models with more sophisticated rigidities than those arising from simple market power and to explore their positive and normative properties. This should be the object of further research.

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APPENDIX

We shall in this appendix derive, under a more general form, the objective demand curves used in the text (cf. notably equations (16) and (17)), and show how all the results extend without modification to general aggregator functions Λ and V.

The objective demand curves

When computing the objective demand curve for the product he sells, each price maker has to forecast the demand forthcoming to him for any value of (i) the price or wage he determines (ii) prices and wages set by other agents. Following the methodology developed in Benassy (1988, 1990), we see that the natural definition of objective demand at a price-wage vector (P,W) is simply the demand forthcoming at a fix-price equilibrium corresponding to (P,W), which we shall now compute.

We may note before actually starting computations that, according to a traditional result in imperfect competition, each agent will set the price of the good he controls at a level high enough for him to be willing to serve all demand forthcoming, and actually even more. We are thus, in "fix-price" terminology, in a situation of generalized excess supply where each agent is constrained in his supply (but unconstrained in his demands) and thus takes the level of his sales as a constraint.

Consider first firm j. For given prices and wages its optimization program is :

$$\text{Max } p_j\, y_j - \sum_{i=1}^{n} w_i\, \ell_{ij} \qquad \text{s.t.}$$

$$F[\Lambda(\ell_{1j},\ldots,\ell_{nj})] = y_j$$

where y_j is determined by the demand of other agents and thus exogenous to firm j. The solution in ℓ_{ij} to this program is :

$$\ell_{ij} = \phi_i(W)\; F^{-1}(y_j) \tag{57}$$

where $\phi_i(W)$, a function associated to Λ by duality, is homogeneous of degree zero in its arguments. As an example, if Λ is the C.E.S. function (3), then

$$\phi_i(W) = \frac{1}{n}\left(\frac{W_i}{w}\right)^{-\varepsilon} \tag{58}$$

where w is the aggregate wage index given by equation (4) in the text.

Consider now old household i. He owns a quantity of money $\bar{m}_i$ and seeks to maximize his second period consumption index c'_i (8) under the budget constraint :

$$\sum_{j=1}^{n} p_j\, c'_{ij} = \bar{m}_i$$

The result of this maximization is :

$$c'_{ij} = \phi_j(P)\,\frac{\bar{m}_i}{p} \tag{59}$$

where $\phi_j(P)$, associated by duality to V, is homogeneous of degree zero in all prices, and p is the aggregate price index associated to V, given by :

$$p = \sum_{j=1}^{n} p_j\, \phi_j(P) \tag{60}$$

As an example again, if V is the C.E.S. function (10), then :

$$\phi_j(P) = \frac{1}{n}\left(\frac{p_j}{p}\right)^{-\eta} \tag{61}$$

Consider now the government and assume he has chosen a level g_i for the level of public consumption index attributed to household i. The government will choose the specific g_{ij}'s to minimize the cost of doing so, and will thus solve the program :

$$\text{Min} \sum_{j=1}^{n} p_j\, g_{ij} \quad \text{s.t.}$$

$$V(g_{i1},\ldots,g_{in}) = g_i$$

which yields the solution in g_{ij} :

$$g_{ij} = \phi_j(P)\ g_i \tag{62}$$

where $\phi_j(P)$ is the same as in equation (59). The cost to the government is pg_i.

Let us finally consider young household i. Merging his two budget constraints (12) and (13) into a single one, we find that he will determine his current consumptions c_{ij} through the following maximization program :

$$\text{Maximize } U(c_i, c'_i, \ell_0 - \ell_i, g_i) \quad \text{s.t.}$$

$$\sum_{j=1}^{n} p_j\ c_{ij} + \sum_{j=1}^{n} p'_j\ c'_{ij} = w_i\ \ell_i + \pi_i - p\tau_i$$

where the right-hand side (and notably the quantity ℓ_i of labor sold) is exogenous to household i. Given the assumptions on U (separability, homotheticity), the solution will be such that the value of current consumptions is given by :

$$\sum_{j=1}^{n} p_j\ c_{ij} = \gamma(p'/p)\ (w_i\ \ell_i + \pi_i - p\tau_i) \tag{63}$$

where $\gamma(p'/p)$ is the propensity to consume. Maximizing c_i under budget constraint (63) yields the current consumptions c_{ij} :

$$c_{ij} = \phi_j(P)\ \gamma(p'/p)\ (w_i\ \ell_i + \pi_i - p\tau_i) \tag{64}$$

We have now determined all components of the demand for goods. Output y_j will be equal to the sum of demands for good j, i.e. :

$$y_j = \sum_{i=1}^{n} c_{ij} + \sum_{i=1}^{n} c'_{ij} + \sum_{i=1}^{n} g_{ij} \tag{65}$$

which, using (59), (62) and (63) yields :

$$y_j = \phi_j(P) \left[\frac{\bar{M}}{p} + G + \gamma(p'/p) \sum_{i=1}^{n} (w_i\ \ell_i + \pi_i)/p - \gamma(p'/p)\ \theta \right] \tag{66}$$

$$G = \sum_{i=1}^{n} g_i \qquad \bar{M} = \sum_{i=1}^{n} \bar{m}_i \qquad \theta = \sum_{i=1}^{n} \tau_i$$

We shall use the global incomes identity :

$$\sum_{i=1}^{n} (w_i \ell_i + \pi_i) = \sum_{j=1}^{m} p_j y_j \tag{67}$$

Combining (60), (66) and (67) we obtain the final expression for the objective demand addressed to firm j :

$$Y_j = \phi_j(P) \frac{1}{1-\gamma} \left[\frac{\bar{M}}{P} + G - \gamma \theta\right] \tag{68}$$

If the number n of producers is large, p, p' and thus γ are taken as exogenous to firm j and the elasticity of Y_j with respect to p_j is that of the function ϕ_j.

We can now compute the objective demand for type i labor by adding the ℓ_{ij}'s, j = 1,...,n given by equation (57) and replacing y_j by the objective demand Y_j just derived, which yields :

$$L_i = \phi_i(W) \sum_{j=1}^{n} F^{-1}(Y_j) \tag{69}$$

where the Y_j are given by equation (68). Again with large n, the elasticity of L_i with respect to w_i is equal to that of $\phi_i(W)$.

Now formulas (16) and (17) in the text are simply obtained by replacing $\phi_i(W)$ and $\phi_j(P)$ by the specific forms (58) and (61), and using the fact that the values of $\bar{m}_i$, g_i and τ_i are the same for all n households.

<u>General aggregator functions</u>

We shall now show that all results derived in the text with the specific C.E.S. aggregator functions (3) and (10) are valid as well with general forms for Λ and V, and notably that the crucial equations (22) and (25) hold unchanged.

Indeed the first order conditions for programs (A_j) and (A_i) are in the general case :

$$\frac{w_i}{p_j} = \left(1 - \frac{1}{\eta_j}\right) \frac{\partial F_j}{\partial \ell_{ij}} \tag{71}$$

$$\frac{\partial U_i}{\partial(\ell_0 - \ell_i)} = \lambda_i \; w_i \left(1 - \frac{1}{\varepsilon_i}\right) \tag{72}$$

where η_j and ε_i are the absolute values of the elasticities of the functions Y_j and L_i. Looking at formulas (68) and (69), we see that for large n these elasticities are actually those of the functions ϕ_j and ϕ_i, so that :

$$\eta_j = - \partial \text{ Log } \phi_j(P)/\partial \text{ Log } p_j = \eta_j(P) \tag{73}$$

$$\varepsilon_i = - \partial \text{ Log } \phi_i(W)/\partial \text{ Log } w_i = \varepsilon_i(W) \tag{74}$$

Because of the homogeneity and symmetry properties of the original functions Λ and V these elasticities are the same at all symmetric points, and we denote them as η and ε :

$$\eta_j(p,\dots,p) = \eta \qquad \forall\, p\ ,\ \forall\, j \tag{75}$$

$$\varepsilon_i(w,\dots,w) = \varepsilon \qquad \forall\, w\ ,\ \forall\, i \tag{76}$$

Combining (71), (72), (75) and (76) at a symmetric equilibrium, we obtain equations (22) and (25).