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DISEQUILIBRIUM THEORIES, IMPERFECT COMPETITION AND INCOME DISTRIBUTION: A Fix-Price Analysis

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Disequilibrium Theories, Imperfect Competition and Income Distribution: a Fix-Price Analysis

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This paper is an attempt to integrate, within the same simple model, several well-known economic paradigms and to identify their key distinguishing features on the basis of different exogeneity-endogeneity assumptions, derived from different market equilibrium or market structure hypotheses. The framework of analysis is a fix-price quantity constrained model extended to include a market for capital. A break-down of the functional distribution of income between wages, interest and profits is thus possible and the underlying conflicts of interest are highlighted. The linkages between income distribution, imperfect competition, effective demand, "animal spirits" and price and wage rigidities are emphasized. Besides providing for a better relationship between different paradigms, the paper also gives a wider view on the range of possible equilibria and dynamics for a capitalist economy.

(*) Useful comments on an earlier version of the paper by Christopher Bliss, Stephen Marglin, Jean Pascal Benassy and an anonymous referee are gratefully acknowledged. All remaining shortcomings of the paper are obviously the author's exclusive responsibility.

I) Introduction

This paper is an attempt to integrate, within the same simple construct, several well-known economic paradigms and to identify their key distinguishing features on the basis of different exogeneity-endogeneity assumptions, derived from different market equilibrium or market structure hypotheses. The spirit of the paper follows to some extent Marglin's (1981) recent contribution to the comparison of neoclassical, neo-Marxian and neo-Keynesian growth paradigms, but the framework of analysis is the fix-price quantity constrained model of Benassy, Malinvaud and others[1/], extended to include a market for capital services.

By doing so, the paper gives a more integrated and also broader view of possible equilibria and types of behavior than the one found in Marglin. In particular, it links short run Keynesian theory with longer run paradigms and gives an account of the old Keynesian idea of "animal spirits" which is more in line with the fix-price quantity constrained literature. It also establishes an interesting duality between Kalecki's concept of "degree of competition" and the degree of disequilibrium in a perfectly competitive goods market. Finally, by emphasizing the linkages between

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1/ Recent comprehensive surveys of the fix-price literature can be found in Drazen (1981) and Benassy (1982a).

income distribution, imperfect competition, effective demand and price and wage rigidities, it throws a different and more intense light on the underlying forces which may determine the equilibrium and dynamics of a capitalist economy.

The model to be used is presented first. A taxonomy of possible equilibria and adjustment processes is given next. Aspects of income distribution and political economy are examined at the end.

II) The Model

Consider a single good monetary economy with two classes of agents. The first class (workers) get their income from their labour and from the rent of capital to firms. If w is the wage rate, p the price level, r the interest rate on capital services, L and K^W the amounts of labour and owned capital, workers' real income is:

$$Y^W = \frac{w}{p} L + rK^W \qquad (1)$$

The other class is composed of firm owners who have exclusive access to the means of production and derive their income from interest on rented capital and from any excess profits firms

may have[2/]. If τ is a mark-up factor on costs of production and Y is output, firm owners' income is:

$$Y^f = \tau\, Y + r\, K^f \qquad (2)$$

Both classes have similar consumption demands, namely:

$$C^i = C^i(Y^i, \bar{M}^i/p),\ o<C^i_Y<1,\quad C^i_{\bar{M}/p}>o,\ i = f, w \qquad (3)$$

where initial ($\bar{M}^i$) and final (M^i) money holdings must satisfy their budget constraints:

$$C^i + M^i/p = Y^i + \bar{M}^i/p \qquad , i = f, w \qquad (4)$$

The interest rate is always assumed to clear the market for capital services[3/] but prices and wages may not clear the goods and labour markets in the case of excess supply; they are however assumed to rise instantaneously to market clearing levels in the

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2/ Firm ownership is assumed to be quite different from capital ownership. Firms may work with borrowed capital (in the form of loans, bonds or stocks) but are still protected by barriers to entry which prevent workers from forming their own enterprises. Firm owners may thus derive a rent from exclusive access to the means of production.

3/ This hypothesis places the model in a somewhat longer run context than the usual short run Keynesian constructs.

case of excess demands.[4/] Workers' notional supply of labour is assumed to be fixed and independent of the real wage.

The firms production function follows the usual neoclassical postulates and is homogenous of degree one:

$$Y = Y(K,L) \quad , Y_L>o,\ Y_K>o,\ Y_{LL}<o,\ Y_{KK}<o,\ Y_{LK}>o \tag{5}$$

If $\bar{Y}$ is the sales constraint faced by firms, profit maximization in a fully competitive setting may be written as:

$$\underset{L,K}{\text{Max}} \quad [pY\ (K,\ L) - WL - r\ p\ K]$$

Subject to: $Y(K,L) \leq \bar{Y}$

First order conditions are:

$$Y_L\ (1-\tau) = w/p \tag{6}$$

$$Y_K\ (1-\tau) = r \tag{7}$$

where τ is the shadow price associated with the sales constraint. Using Euler's theorem, these two conditions lead to:

4/ The assumption of price and wage adjustment asymmetry seems to be empirically justified and specially appropriate here, given the footnote above. For a recent example of a model using this hypothesis, see Benassy (1982b).

$$P\,Y = \frac{w\,L + r\,p\,K}{1 - \tau} \qquad (8)$$

It can readily be seen that τ is a mark-up factor so that an interesting duality emerges between the degrees of imperfect competition and of disequilibrium in a perfectly competitive framework. Perfectly competitive sales-constrained firms are bound to end up, in the absence of price adjustments, with positive mark-ups over costs. This is equivalent to having prices determined on the basis of an exogenously given mark-up, which is what the imperfectly competitive firm would do.

The basic framework of the model is completed with the following equilibrium conditions:

$$K = K^w + K^f \qquad (9)$$

$$Y = C^w\left(\frac{w}{p}\,L + rK^w,\ \bar{M}^w/p\right) + C^f(\tau Y + rK^f,\ \bar{M}^f/p) + G \qquad (10)$$

where G is government spending.

III) A taxonomy of possible equilibria

Setting aside equation (9) which simply defines the aggregate stock of capital, the production function (5), the first order conditions (6) and (7), and the good market equilibrium condition (10) form a system of 4 equations in 6 unknowns: two quantities (Y and L), two prices (w and p) and two rates (r and τ);

two of these six variables must therefore be specified exogenously in order to close the model. As will now be seen, different types of economic behavior and paradigms can be associated with different choices for these two pre-set variables.

A useful graphical analysis can be achieved by noting first that, because of the homogeneity postulate, the capital/labour ratio can be eliminated from (6) and (7) to give a family of factor price frontier curves represented in Figure 1 as a set of downward sloping curves in the space (w, r). The one further to the right corresponds to the purely competitive unconstrained case ($\tau = o$);[5/] these curves shift inwards as τ rises due to rising degrees of imperfect competition or market disequilibrium. On the other hand, the elimination of τ between (6) and (7) gives the capital/labour ratio as a direct function of the wage/rental ratio. The iso-employment or iso-output loci associated with the given amount of capital can therefore be represented as straight lines passing through the origin and rotating counter-clockwise as employment and output fall. The region of excess supply for both goods and labour is limited, in Figure 1, to the area above the full-employment locus ($Y = Y^F$) and below the unrestricted factor price frontier.

The typology of possible equilibria can now be easily visualized. Point C, at the intersection of the full employment schedule and the unrestricted factor price frontier, is the neo-

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5/ The shadow price associated with the sales constraint clearly vanishes when the latter is no longer binding.

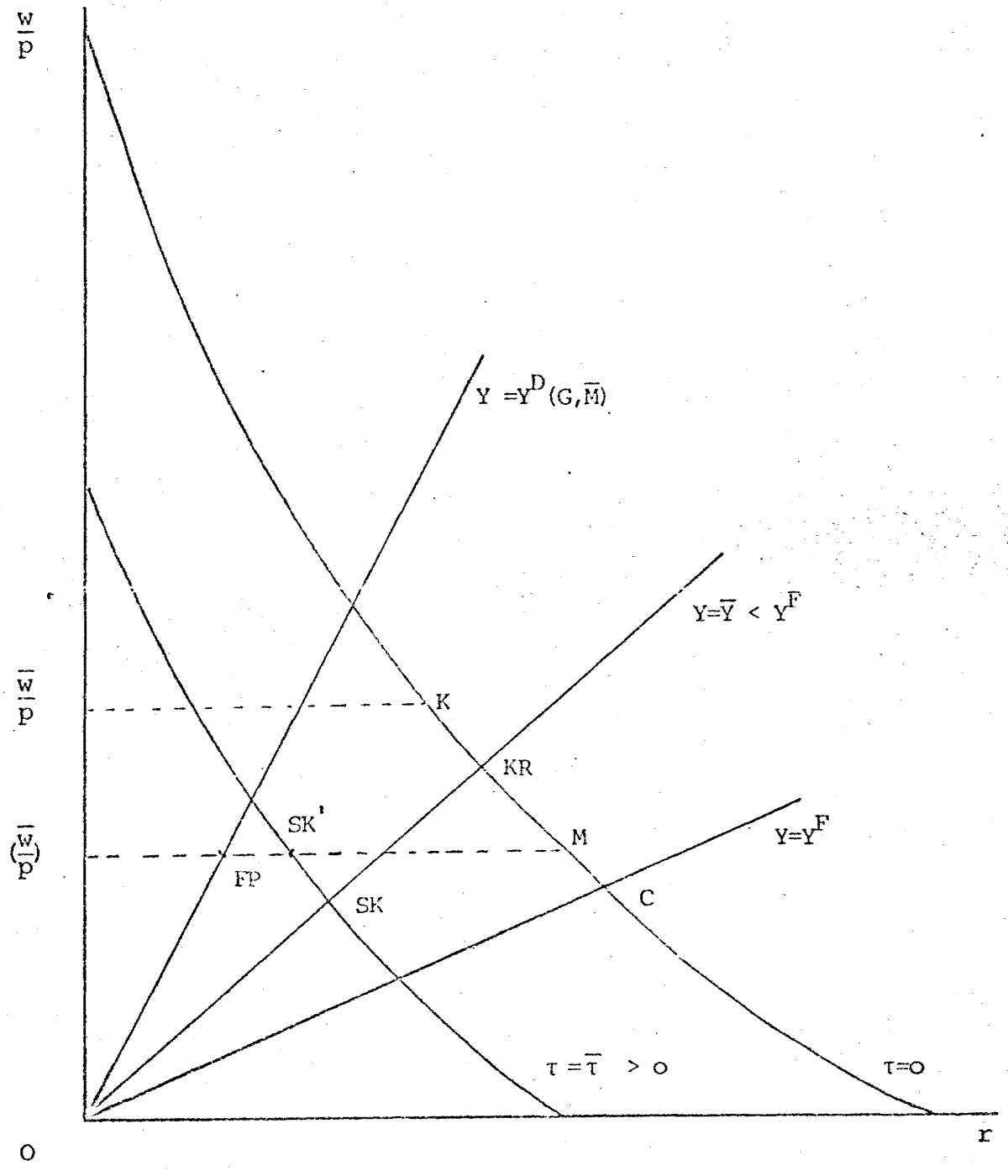

Figure 1

classical equilibrium. The two pre-set variables associated with that equilibrium are L (equal to L^F) and τ (equal to zero). The wage level adjusts to maintain full-employment, while prices adjust (through the real balance effect) to ensure a good market equilibrium.

Suppose now that the real wage is institutionally set at a level $(\frac{\overline{w}}{p})$, the "subsistence wage", and that the economy is perfectly competitive with perfectly flexible prices and wages, so that firms are never sales constrained ($\tau = o$). This new equilibrium with endogenous employment (M in Figure 1) is the neo-Marxian one.

A similar pattern emerges when nominal wages are exogenously given ($w = \overline{w}$), and are set at a level which is too high to clear the labour market at the price p which clears the goods market in a perfectly competitive environment ($\tau = o$). This is an equilibrium (K in Figure 1) which is perhaps the closest in spirit to Keynes' own formulation.

Suppose, on the other hand, that the expected sales constraint is exogenously given, at a level $Y = \overline{Y} < Y^F$, by a prevailing state of "animal spirits". Suppose also that prices still adjust to clear the goods market at $\overline{Y}$, so that the economy still ends up on the unconstrained factor/price frontier ($\tau = o$). We now find a Keynesian type of equilibrium which is closer in spirit to neo-Keynesian growth theory à la Kaldor or à la Robinson; let KR be this equilibrium in Figure 1. Here, the real wage can adjust to ensure that firms stay

on their demand curve for labour but not enough to ensure full-employment.[6/]

Two remarks are in order here. Notice first that rigid nominal wages and given animal spirits are two mutually exclusive Keynesian concepts in this perfect foresight deterministic framework since rigid nominal wages would not usually, in the scenario just described, allow output to adjust all the way to $\bar{Y}$. Notice also that in this model animal spirits have been introduced through the state of sales expectations, with a freely adjusting interest rate. An alternative scenario, which is the one usually given in neo-Keynesian growth theory, would have started from an exogenously given interest rate, set by a given state of profit expectations; sales would then adjust endogenously.

Assume now that both prices and wages are rigid downwards; with excess supply for labour and goods, these two variables are therefore set exogenously, and the real wage is fixed. Output must then adjust to satisfy a demand which is itself a function of government spending policies. The story behind this fix-price equilibrium (FP in Figure 1) is the one underlying the usual short run Keynesian models. Note in particular that it implies varying rates of mark-up as output varies with the level of demand.

Up to now, the case of imperfectly competitive firms has

6/ The usual story given to justify this adjustment process is in terms of a target real wage and an endogenously determined rate of inflation which prevents workers from reaching their target (see for example Marglin (1981), chapter 19).

not been considered since it has been assumed that the rate of mark-up is either zero or is left to adjust freely. Suppose, on the other hand, that, as a result of some kind of tacit agreement between firms, there exists a positive and given rate of mark-up, in the tradition of Kalecki's "degree of competition" concept. With a given τ, there are two plausible ways to close the model. The real wage may be given exogenously and employment must then adjust, as in the Marxian model. Alternatively, output may be given (either by a given state of animal spirits or by the full-employment condition) and the real wage must then adjust. In the first case, the functional parameters of income distribution ($\frac{w}{p}$ and r) determine uniquely the level of economic activity, as in the neo-Marxian model, but in a more general way. In the second case, the real wage can still be defined ex ante as a target real wage which may be forced, ex post to adjust, through an endogenously determined rate of inflation. Because of this close association between imperfect competition, income distribution and economic activity, these models (SK and SK' in Figure 1) could perhaps be labelled structuralist-Kaleckian.

Notice finally that we have not yet exhausted all the possible pairs of exogenous variables selected among the list of six. However, a more careful examination reveals that all the other models would either be minor variations of the ones already mentioned or would not be economically sound because they would

require implausible price or wage adjustment processes.[7/]

IV) Some considerations on the political economy of disequilibrium models.

If both output and the rate of mark-up are allowed to vary, possible outcomes for the distribution of income can be plotted on a three dimensional space in w, r and τ. With τ constant, the determination of w and r follows a class struggle process along Marxian lines. With r constant, the Kaleckian state of monopoly defines the distribution of income in terms of wages and excess profits. With w constant, there exists an additional conflict between interest and profits which becomes increasingly relevant as workers own a larger part of the capital stock.[8/]

These conflicts of interest between firm owners and workers can be more clearly visualized by drawing the iso-income contours for both classes. Assuming for simplicity a C.E.S. production function and using a diagram like Figure 1, it is shown in the appendix that firm owners' income is maximized at the origin and

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7/ Take for example the case of an exogenous real wage and a given state of animal spirits. This would require prices to be flexible enough to adjust the demand for goods to a level compatible with $\bar{Y}$, but not enough to clear the goods market. This clearly does not make much economic sense.

8/ Notice that the profit-interest conflict can be seen as a combination of the Marxian class struggle and the Kaleckian state of monopoly concept, since a movement along a line of constant real wages can be decomposed into a vertical movement along an iso-interest line and a movement along an iso-profit line (see Figure 1).

that their iso-income contours (the I^f curves on Figure 2) are upward sloping and intersect the iso-employment loci from above. The shape of workers' iso-income contours (the I^w) depends on the elasticity of substitution between capital and labour. High elasticities (between one and plus infinity) imply that workers maximize their income (taken as a whole) at the classical equilibrium, and that their iso-income contours are downward sloping and intersect the iso-profit loci from below. For lower elasticities of substitution, the point of maximum income may eventually move upwards on the unconstrained factor price frontier if capital is relatively more scarce than labour In this case, the iso-income contours, while still downward-sloping, will now intersect the iso-profit lines twice (see Figure 3).

In the case of high elasticities of substitution it is easy to see that the set of Pareto optima (the contract curve) is the segment OC of the full-employment locus (see Figure 2). Marxian class struggle, on an iso-profit line, is then hard to justify, since it would be advantageous for both classes to move down the iso-profit schedule towards full-employment. The pure Kaleckian conflict between wages and profits clearly makes more sense since a fall in wages and a rise in profits, with a constant interest rate, makes workers worse off and firm owners better off. Notice however that if the economy is off the contract curve (for example at H_1) a pure Kaleckian move, down to H_2, may be less likely to occur than a mixed move with a rising interest rate to some point between C and H_3 on the full-employment locus, which makes everyone better off.

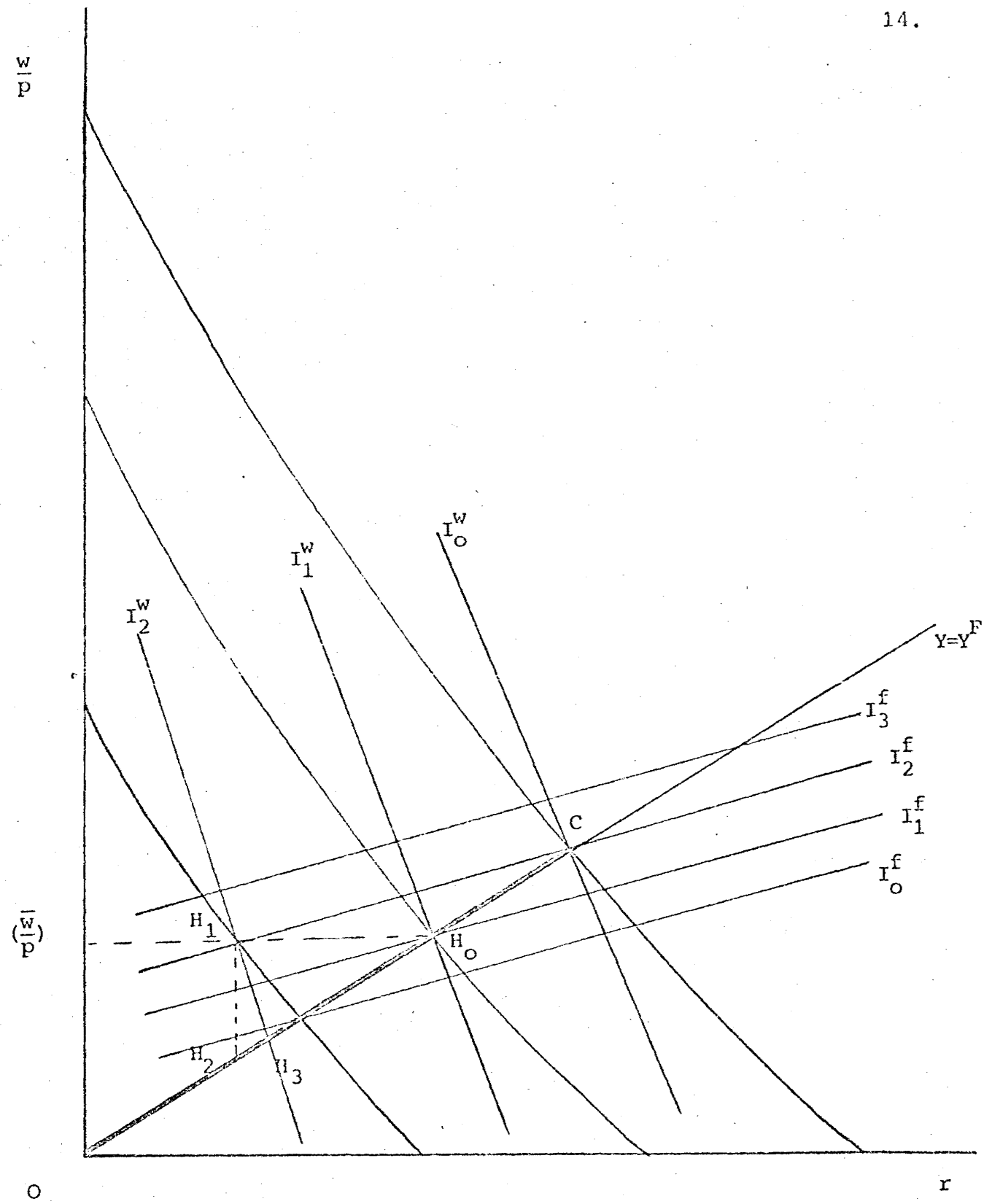

Figure 2

Class conflict reaches a peak on the contract curve since any move there necessarily makes someone worse off. A typical conflict scenario might involve in this case an autonomous rise in prices (or in nominal wages, depending upon where the initiative comes from), probably followed immediately by a parallel rise in nominal wages which would leave real wages constant. The reason for this is easy to understand. Suppose that the economy is initially at H_o; if price rises are fully accommodated on the monetary side, the economy stays at H_o; if full accommodation does not take place, it moves to a point such as H_1 which makes everyone worse off. If both classes stick by the rule of real wage invariance, it would tend to discourage everyone from attempting to change the status quo. Similarly, if the shock comes initially from a fall in aggregate demand, which moves the economy from H_o to H_1, nominal wages and prices are likely to be sticky downwards, as a way to prevent a return to a different equilibrium on the full-employment locus. Both real and nominal wage stickiness are therefore justified.

In the case of low elasticities of substitution, the set of Pareto optima may now be extended to include, besides the full-employment locus, the segment of unconstrained factor price frontier between the classical equilibrium and workers under-employment optimum H^* (see Figure 3). On that segment, Marxian class struggle becomes relevant. In addition, it is particularly interesting to notice that the set of stable (in the sense of being on

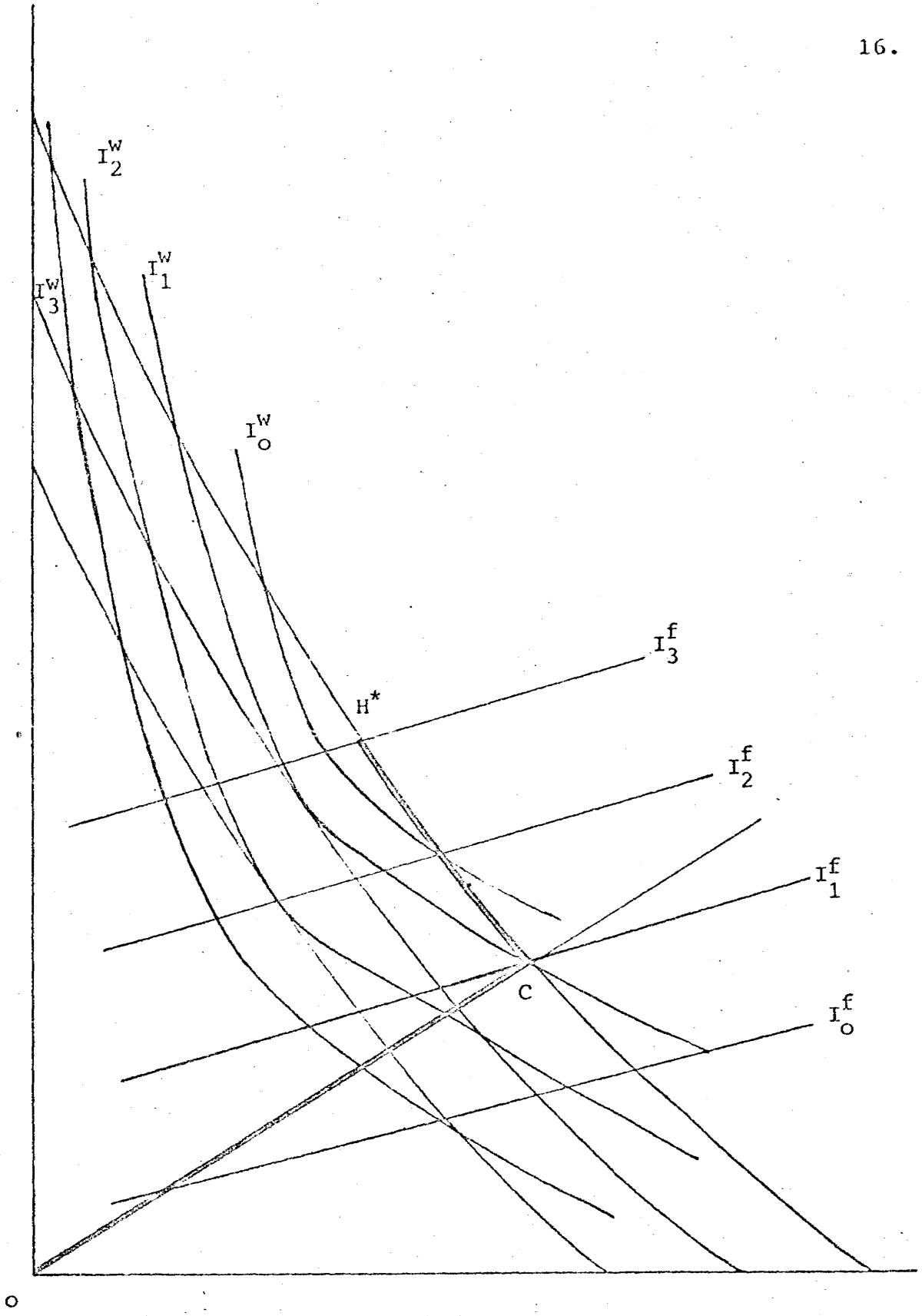

Figure 3

the contract curve) underemployment equilibria are perfectly competitive, thus lending full support to the pure Marxian model. On the other hand, stable non-competitive equilibria are found only at full-employment, as in the high elasticity of substitution case.

V) Conclusions

Different economic paradigms are typified in this paper on the basis of different pairs of exogenously set variables. Seven plausible models are thus identified, from the classical to structuralist-Kaleckian models, and including a Marxian, a Keynesian and several neo-Keynesian constructs. The analysis, which is initially centered around different market equilibrium hypotheses, then moves on to examine the conflicts of interest which underlie those equilibria and which improve our understanding of the justification for them and some of the links between them.

The model presented above is a highly schematic one and as such cannot pretend to capture all these paradigms in their full complexity. However, the aspects emphasized here appear useful in relating the models and in widening our view of the range of possible macroeconomic equilibria and dynamics.

Appendix

Let $Y = [\alpha_L L^{-\beta} + \alpha_K K^{-\beta}]^{-1/\beta}$ be the C.E.S. production function.

the corresponding first order conditions are:

$$L = \left[\frac{\alpha_L(1-\tau)}{w/p}\right]^{\frac{1}{1+\beta}} Y \qquad \text{(A-1)}$$

$$K = \left[\frac{\alpha_K(1-\tau)}{r}\right]^{\frac{1}{1+\beta}} Y \qquad \text{(A-2)}$$

and the factor price frontier is:

$$\alpha_K\left[\frac{r}{\alpha_K(1-\tau)}\right]^{\frac{\beta}{1+\beta}} + \alpha_L\left[\frac{w/p}{\alpha_L(1-\tau)}\right]^{\frac{\beta}{1+\beta}} = 1 \qquad \text{(A-3)}$$

Consider first firm owners' income. If λ^f is the proportion of capital which they own, their income is:

$$Y^f = \tau Y + \lambda^f rK \qquad \text{(A-4)}$$

Y^f rises with r when τ is constant, since Y rises with r (see condition (A-2)). Similarly, Y^f rises with τ when r stays constant since Y also rises with τ (see (A-2)). Consider finally a change in τ with Y constant. From the differentiation of (A-2): $dr = -\alpha_K (Y/K)^{1+\beta} d\tau$; so that the differentiation of (A-4) can be written: $dY^f = Y\left[1 - \alpha_K \lambda^f (Y/K)^{\beta}\right] d\tau$. Substitute Y/K obtained from (A-2): $dY^f = Y\left[1 - \lambda^f \alpha_K \left[\frac{r}{\alpha_K(1-\tau)}\right]^{\frac{\beta}{1+\beta}}\right] d\tau$. (A-3) indicates that the expression between brackets is always positive, so that firm owners' income rises with τ. By inspection, it then becomes clear that their iso-income contours must be upwards sloping and intersect

the iso-employment loci from above.

Workers' income is:

$$Y^W = \frac{w}{p} L + \lambda^W r K \qquad \text{(A-5)}$$

With L constant, r rises with $\frac{w}{p}$, since (A-1) and (A-2) imply:

$$r = \frac{\alpha_k}{\alpha_L} \frac{w}{p} (L/K)^{1+\beta} \qquad \text{(A-6)}$$

hence, Y^W rises with $\frac{w}{p}$. With $\frac{w}{p}$ constant, (A-6) shows that L rises with r and hence Y^W is also directly related to the interest rate. Consider finally a change in real wages with a constant mark-up. From (A-6) $\frac{wL}{p} = (\frac{\alpha_L}{\alpha_K})^{\frac{\beta}{1+\beta}} r^{\frac{\beta}{1+\beta}} (\frac{w}{p})^{\frac{\beta}{1+\beta}} K$; and from (A-3):

$$dr = -\left[\frac{\alpha_L}{\alpha_K} \frac{r}{w/p}\right]^{\frac{\beta}{1+\beta}} dw.$$

So that $dY^W = \frac{K}{1+\beta} \left[\frac{\alpha_L}{\alpha_K} \frac{r}{w/p}\right]^{\frac{\beta}{1+\beta}} \left[\beta - (\frac{\alpha_L}{\alpha_K})^{\frac{\beta}{1+\beta}} (\frac{w}{rp})^{\frac{\beta}{1+\beta}} - \lambda^W (1+\beta)\right] dw.$

A maximum is obtained for $(\frac{w}{rp})^* = (\frac{\alpha_K}{\alpha_L})^{\frac{1}{\beta}} \left[\beta(1-\lambda^W) - \lambda^W\right]^{\frac{1+\beta}{\beta}}$. This maximum will be below full-employment if the wages rental ratio is higher at that point than at full-employment. Hence, with (A-6):

$$(\frac{\alpha_K}{\alpha_L})^{\frac{1}{\beta}} \left[\beta(1-\lambda^W) - \lambda^W\right]^{\frac{1+\beta}{\beta}} > \frac{\alpha_L}{\alpha_K} (\frac{K}{L^f})^{1+\beta}, \text{ or: } \frac{K}{L^f} < \left[\frac{\alpha_K}{\alpha_L} (1-\lambda^W) - \lambda^W\right]^{\frac{1}{\beta}}$$

For $\beta > \frac{\lambda^W}{1-\lambda^W}$, the expression between brackets in this last inequality is positive and there will exist an optimum below full-employment if the capital labour ratio at full-employment is not too large.

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