CENTER OF PLANNING AND ECONOMIC RESEARCH

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I

In the history of economic thought, there is a great tradition, whose imprints are still very visible, especially in Anglo-Saxon economics, to which we attach the label "neoclassical theory". It is, of course, impossible to pinpoint any particular economist as either the founder or the most representative member of the neoclassical school, in the same fashion as Keynes was at great difficulty to attack some specific "classicist" in his General Theory. And yet, it is precisely the lesson we got from Keynes, a lesson that was later distorted, that a new and different theory must be confronted with its antithesis, if we are to comprehend the new and distinguish it from the old. One would venture the speculation that theories are developing (or, perhaps, evolving) in a dialectical manner, the same way economies and societies do, whose deeper character and reflection we seek in the scientific contemplation that culminates in a theoretical scheme. In the 1930's, the structure of the Western industrial economies was very much different from that of the "primitive" or "pure" capitalism of the 19th century, and the careful thinker will only confirm the further changes that took place since the 1930's until our own days. Social science may overlook the ephemeral and transcend the temporary, but it is certainly not supposed to forget the fundamental actuality. Economic theory will find its ultimate justification in the concrete interpretive value of its propositions, and in the understanding of reality.

Neoclassical theory was gradually formulated in an era when capitalism was functioning through the interplay of a great number of relatively small and competitive economic units. The theory of pure competition, the logical founda-

tion of neoclassical macroeconomics, reflects exactly these elements: the absence of extensive monopolistic or monopsonistic powers, the absence of governmental intervention, the preponderance of impersonal market forces. In other words, neoclassical theory was faithful to Adam Smith's "invisible hand", and the principle that if all these economic units are not hindered in the pursuit of their individual happiness, the economy as a whole will be in harmony. The impersonal price adjustments will suffice in bringing every market in equilibrium, and, furthermore, these partial equilibria will be mutually consistent. This is the essence of general equilibrium. There can be no overproduction of commodities, as there can be no under-utilisation of the productive factors. Adam Smith and Jean Baptiste Say did believe in the inherent harmony of competive economies, and their tradition has an enriched modern version in the doctrines of the "monetarists". Economic reality has changed, but the vision of these contemporary classicists remains old, clinging to the dream of uncontrolled market forces as a definite possibility, either as a form of nostalgia for the "good old times", or for political purposes. Professor Frank Hahn, in his inaugural lecture at the University of Cambridge, attempted to defend the general equilibrium theory (without ignoring its limitations) from a methodological point of view, interpreting the work of Léon Walras as a framework of theoretical analysis rather than as a final description of concrete situations. It is the opinion of many general equilibrium theorists that such a framework is potentially flexible enough to be the foundation of a general economic theory, although Hahn is among the first to concede that there appear to be insurmountable difficulaties in this direction. At the same time, Professor Nicholas Georgescu-Roegen accuses the quantitative or "arithmomorphic" models of being incapable of describing any concrete economic system, because the qualitative elements elude

any determinate system of equations. For him, the neoclassical tradition, and especially the work of Walras, modelled after classical mechanics at a time when physicists were undergoing their "quantum revolution", is narrow and unhistoric.

Methodological disputes are very old in the history of economics, as indeed in every science, since it is the combination of abstract thought, empirical observation, and vision (as Schumpeter emphasised) that makes a complete theory. We see these ingredients in varying proportions in the works of great economists. For example, Ricardo and Keynes were particularly strong in combining abstract thought with empirical observation, while Marx (and Schumpeter himself) had great visions. Walras' work (especially his Eléments d' Economie Politique Pure) is distinguished primarily for its abstract thought, and especially the elegant schematisation of an economy in a system of simultaneous equations. The Walrasian system is considered the foundation of what we, today, understand as neoclassical theory. The economic units or agents are permitted, in his framework, to engage in production and exchange, at a vector of prices such that not only every individual market will be cleared, but also such that all markets will be simultaneously cleared in an inherent general equilibrium. Under Walras' assumptions, such a general equilibrium position is indeed theoretically possible, as the subsequent work of Von Neumann and Debreu indicates. The full utilisation of all productive factors, and the impossibility of either under - or over - production can in fact be proved if, in a competitive framework, the impersonal market forces do lead to the market clearing price vector. Adam Smith's invisible hand was personalised by Walras in his fictional character of an auctioneer, situated somewhere in the middle of an ocean (the Atlantic, of course), omniscient of all agents' intentions in every market, and omnipotent

in changing prices in the right direction. When he strikes, through this tâtonnement, the price vector that would be consistent with general equilibrium, then he signals to the agents that now they can engage in their economic activities of production and exchange. When the agents do that, they miraculously find out that their decisions are mutually consistent, all their expectations about incomes and expenditures are realised, and the general equilibrium thus reflects the harmony of such an ideal economic system. The omniscient and omnipotent auctioneer evokes to some people the idea of a huge computer, while to others Divine Providence, an idea not yet dead at the time Smith wrote about his invisible hand.

But what would happen if there were no tâtonnement, if there were no auctioneer? Is it logical to expect that real economic units would not be activated until they reach the general equilibrium price vector? And furthermore, how do the individual agents know which is the general equilibrium price vector? A real economy is constantly working and functioning. The agents (households and firms) do not have at their disposal any other information about their economic environment than what the current situation tells them. They do have plans about their future, and expectations for the present, but they generally lack the a priori knowledge of the general equilibrium conditions which the Walrasian methodology assumes they do have. The agents, therefore, act on the basis of the currently available information, regardless of whether their respective markets are cleared or not. In the language of general equilibrium theory, production and exchange are permitted even at "false prices", i.e. at non-market-clearing price vectors, contrary to the Walrasian tâtonnement assumption. If the markets, however, are not in perpetual equilibrium (or always and only in equilibrium), the plans of the economic units will not necessarily

be mutually consistent. In such cases, the endogenous adjustments in the system will not only be in price changes (like those effected by the auctioneer or the impersonal market forces), but also in "quantity" changes, since such "quantity variables", like realised labour income, realised profits and realised consumption, will differ from their constant values consistent with the general equilibrium position. When Hicks, in his "Value and Capital", formulated a neo-Walrasian general equilibrium system by incorporating demand functions derived from maximising ordinal utility functions, he worked in showing the stability and comparative-statics properties of his system by virtually ignoring the income effects as "unimportant", basically because he was working in a pure "price adjustments" framework, i.e. in a scheme where prices change and bring the system to general equilibrium, while the "quantity variables" are virtually fixed at their general equilibrium values. Likewise, Patinkin, in his "Money, Interest and Prices", used the Walrasian methodology in constructing his neo-classical macro-model, by taking the level of national income (and thus the level of labour employment, as well) as being given at the full employment (general equilibrium) level, and then proving the convergence to a unique general equilibrium on the basis of changes in the price level and the rate of interest, again a pure "price adjustments" framework.

Professor Nicholas Kaldor, in an old article of his entitled "The Determinateness of Static Equilibrium", distinguished between the endogenous adjustment mechanisms and the conditions of equilibrium. He told us that the adjustment mechanisms will be sufficient to lead to an equilibrium position if certain prerequisites hold: First, that the system does possess an equilibrium and the mutual consistency of the agents plans required for it. Second, that the adjustment mechanisms work in the right direction. Third, that the condi-

tions of equilibrium are not affected in the process towards equilibrium. In the partial equilibrium analysis the problem of satisfying Kaldor's prerequisites is not very acute, because we make the "ceteris paribus" assumption, and the general equilibrium theories of Hicks, Samuelson, and Debrou do have a "partial equilibrium" flavour. But in the work of Patinkin, for example, it makes no sense at all to take the level of income as given at the full employment level, and thus make it a condition of equilibrium unaffected by the process towards equilibrium, as an analytical device in order to prove that in neoclassical macro-theory the economy always tends towards full employment. Patinkin's work, in other words, presumes the Walrasian auctioneer and his tâtonnement, and his analysis of disequilibrium situations (in Chapter 13 of his book) is terribly obscure and incomplete because such situations are presented only as the periods during which the price level and the interest rate change due to non-clearance in the commodities and bonds markets, while the labour market is assumed to be in perpetual equilibrium. Once we abandon this last assumption, and also permit the system to operate at "false prices", then we see that all the nice properties and predictions of neoclassical macroeconomics are due only to the Walrasian methodological assumptions, and that they are, therefore, either misleading or false.

The levels of labour employment and national income cannot be considered as given conditions of a general equilibrium position, but rather as the most important variables in macroeconomic theory. It is their adjustments which determine the process towards a macroequilibrium as well as the nature and characteristics of such a macroequilibrium. That was the lesson we have learned (or ought to have learned) from Keynes. The neoclassicists' distortion of Keynes's teaching, the construction of what Samuelson called the "neo-

classical synthesis", is a very unfortunate event in the history of economic thought. The Keynesian Revolution taught us that situations of unemployment, and disequilibrium in general, are not necessarily transitory phenomena during the adjustments of an economy in harmony, but instead they can be inherent characteristics of a modern industrial economy. The "Keynesian" models of the neoclassicists do not have any important rôle for the principle of effective demand, the cornerstone of Keynes' theory, and they are, as Negishi appropriately commented, like Hamlet without a prince in it! In the neoclassical synthesis, the underemployment situation of Keynes was rationalised in terms of either a liquidity trap, or of having ex ante savings and investment inconsistent at any positive interest rate, or of assuming completely rigid money wages. Bringing into the analysis the "real balance effect", it is basically the wage rigidity that can explain Keynesian unemployment, a truly ad-hoc assumption. The task of macroeconomic theory does not consist in relying on the assumption of money wage rigidity in order to explain unemployment, but instead, it consists of explaining rather than postulating why real wages do not adjust in the presence of unemployment so as to eliminate it.

To quote Professor G. Shackle: "The fatal defect (of neoclassical theory) was its assumption that men possess adequate knowledge, that they can act in the light of reason fully supplied with its necessary data. But this assumption is contrary to all experience ..... Unemployment is due to men's failure to secure, in good time, knowledge of each others "conditional intentions" or potential reactions ..... Unemployment is the consequence and reflection of disorder. A theory of unemployment is, necessarily, inescapably, a theory of disorder", (The Years of High Theory, p.p. 136, 140-1, 133). Shackle's admirable interpretation of Keynes runs parallel to the critique by Georgescu-

Roegen: "Many still share the idea that the Walrasian system would be an accurate calculating device for a Laplacean demon ..... This logic ignores a most crucial phenomenon: the very fact that an individual who comes to experience a new economic situation may alter his preferences. Ex post he may discover that the answer he gave to our demon was not right. The equilibrium computed by our demon is thus immediately defeated not by the intervention of exogenous factors but by endogenous causes. Consequently, our demon will have to keep on computing running-away equilibria, unless by chance he possesses a divine mind capable of writing the whole history of the world before it actually happens ..... One additional difficulty into which our demon would certainly run with the Walrasian system. It is the Oedipus effect, which boils down to this: the announcement of an action to be taken changes the evidence upon which each individual bases his expectations and, hence, causes him to reverse his previous plans", (The Entropy Law and the Economic Process, pp. 334-335).

The critique of neoclassical theory presented here (and it is certainly not the only possible line of critique, as it is well known) does, however, contain the important ingredients of a reconstruction of macroeconomic theory that was attempted in the last ten years. The original intention of the revisionist theorists was to give a more definite explanation of Keynes' unemployment proposition, to start, in other words, a "Keynesian Counter-Revolution". This was the title of an important article by Robert Clower, who initiated this trend of thought. Axel Leijonhufvud, carried on the distinction between conventional (i.e. neoclassical) "Keynesian Economics and the Economics of Keynes" in an important book bearing this title. But the issue is broader than a mere re-interpretation of Keynes. It laid the foundation of "disequilibrium macroeconomics", a theoretical approach going back to the theories of

the Stockholm School, and especially the work of Bent Hansen. Clower's basic point was what he called the "dual decision hypothesis", which amounts to this: in situations of disequilibrium, a consumer's realised expenditure will be different from his intended expenditure to the extent that his realised income from labour employment is different from his expected income and employment. In a non-Walrasian world, if production and exchange are permitted to take place even at "false prices", an excess supply in the labour market will correspond to an excess supply in the goods market, since effective aggregate demand is determined and limited by actual employment and actual (effective) aggregate income. This seems also to be the true meaning of Keynes' consumption function. Thus, effective excess demands may be non-zero in all markets, while the "national" excess demands (i.e. those corresponding to the full a priori knowledge of the general equilibrium price vector) are zero in the neoclassical equilibrium. In a non-Walrasian scheme, situations of non-zero excess demands will generate not only "price-adjustments" but also "quantity-adjustments", because employment and income are no longer given at their full employment values. The implication of the "dual decision hypothesis" and the absence of the Walrasian auctioneer is that the interplay of the price-cum-quantity adjustments will not necessarily lead to a neoclassical full-employment general equilibrium, but they may instead lead to what Bent Hansen called a "quasi-equilibrium". A quasi-equilibrium is defined as a situation where although the relative prices are determined, the system is not in equilibrium in the traditional sense. The excess demands are not zero, and the absolute prices are continuously increasing or falling. "Whereas the forces at work on the absolute prices do not cancel each other out, those at work on the relative prices do". Thus, the explanation of the Keynesian proposition of an "unemployment equilibrium" must be pursued

on the basis of a non-Walrasian methodology, and of a system capable of having a quasi-equilibrium. This is the essence of "disequilibrium macroeconomics" which seeks to explain the persistence of such phenomena of disorder like unemployment and inflation (i.e. situations of disequilibrium, non-zero excess demands) rather than reduce the actuality of these phenomena to mere exceptional and transitory aspects of an otherwise assumed economy devoid of disorder.

II

In this section we outline a simple theoretical model in which the persistence of unemployment and inflation are explained by the possibility of having quasi-equilibria, and the impact of expectations. Since a general disequilibrium macroeconomic model is quite complicated because it involves numerous adjustment mechanisms, it can either be presented by a simulation model or by a model where the adjustments are artificially decomposed in separate "stages" in order to avoid the simultaneity of the numerous adjustments. The simultaneity of these events is not really denied, but it is analytically very convenient to assume such a decomposition of the events, in the spirit of the old "period analysis". In this we follow a pattern established by Solow and Stiglitz. Finally, we will not examine here the working of the financial sector of the economy, as this was done elsewhere, but instead we will concentrate in a two-market model, focusing on the essential character of the circular-flow-of-income scheme which stresses the interplay between the output and the labour markets. Our particular analytical strategy consists of distinguishing three time-periods. First, the Momentary Situation (MS): it defines an infinitesimally short time period during which all "prices" are given. On the basis of these prices, the plans of all the agents are formulated. If at the given "prices" there correspond non-zero excess demands, the actual "quantities" transacted in each market will be determined by some rule. Such non-zero excess demands will generate "price changes" (i.e. adjustments) at the transition from one MS to another, so that at the beginning of the new MS a new set of prices

will be given to the agents, and the plans will be reformulated accordingly. Second, the Short-Run (SR): it is defined as the time sequence of MS, but it is sufficiently short so that we can ignore the effects of capital accumulation and population growth. During the SR, it is the "price adjustments" which are the principal ones, while the corresponding "quantity adjustments" are derived from the price adjustments. The SR equilibrium is attained when these adjustments stop, which happens when the market forces responsible for them are neutralised. This SR equilibrium will either be a full-equilibrium, if all markets are cleared then, or a quasi-equilibrium if not all the markets are cleared but nothing changes the situation at the same time, due to the structure of the model. Third, the Long-Run (LR): it is defined as the time sequence of SR full - or quasi-equilibria. From one SR equilibrium to another we take into account the effects of capital accumulation and population growth, as factors which cause shifts in the supply and demand schedules in the (output and labour) markets. The zero or non-zero excess demands in each market, as determined in the SR equilibria, will now be conditioned by these LR effects, as the latter are summarised by two critical ratios: the (desired and/or actual) labour employment-capital ratio (ε) which is the determinant of the output-capital ratio (y), and the labour supply-capital ratio (v). The LR equilibrium (the steady-state) will consist of the determination of (ε, v), and thus of the steady-state output per head and of the steady state rate of unemployment (ε/v or $u = v - \varepsilon$).

In the MS we assume that the actual labour employment (N^{ε}) is determined by:

$$N^{\varepsilon} = \min (N^{d}, N^{s}) \qquad (1)$$

so that the supply (production) or real output (Q^{s}) is, in turn, determined by:

$$Q^{s} = F(N^{\varepsilon}), \qquad F' > 0, \qquad F'' < 0 \qquad (2)$$

The labour demand and supply functions are conventionally defined in terms of the real wage rate ($w = W/P$) as:

$$N^d = h(w), \qquad h' < 0 \tag{3}$$

$$N^s = j(w) \qquad j' > 0 \tag{4}$$

and we assume that there exists a positive w_f such that:

$$h(w_f) = j(w_f) \tag{5}$$

Thus, equation (2) is transformed into:

$$Q^s = F\left[\min\ (N^d, N^s)\right] = f(w) \tag{6}$$

where

$$f'(w) \gtrless 0 \qquad \text{and } f'(w) \lessgtr 0 \qquad \text{as } w \lessgtr w_f \tag{7}$$

The symbol w thus denotes the real wage assumed to be given at the beginning of each MS, because the money wage (W) and the price level (P) are assumed given. Output is assumed homogeneous(like labour),and perishable,to avoid the complication of stocks.

For the aggregate demand for output we assume that it consists of the demand for consumption (C) which depends on disposable income (Q_{di}), and the demand for investment (I) which depends on an assumed given (and controlled by the monetary authorities) rate of interest. This permits us to treat I as an exogenous variable.

$$Q^d = C + I \tag{8}$$

We postulate, for simplicity, a linear consumption function:

$$C = (1-s)\, Q_{di} \tag{9}$$

where s is a constant propensity to save. Disposable income has two components: realised labour income (wN^e) and realised profits of the firms (Π), such that profits (in real terms, deflated by P) are determined by:

$$\pi = Q^* - wN^\varepsilon \tag{10}$$

where Q^* is the realised volume of output sales, determined, in each MS, by:

$$Q^* = \min (Q^d, Q^s)$$

Thus,

$$Q_{di} = wN^\varepsilon + n = wN^\varepsilon + (Q^* - wN^\varepsilon) = Q^* = \min (Q^d, Q^s) \tag{11}$$

and

$$Q^d = C + I = (1-s) \left[\min (Q^d, Q^s)\right] + I \tag{12}$$

We now have the following cases:

$$Q^d = (1-s)\, Q^d + I \quad \text{or} \quad Q^d = \frac{I}{s}, \quad \text{if} \quad Q^d < Q^s \tag{13}$$

$$Q^d = (1-s)\, Q^s + I = (1-s)f(w) + I = \Phi (w;I), \quad \text{if } Q^d > Q^s \tag{13a}$$

$$\text{with} \quad \Phi_w \gtrless 0 \quad \text{and} \quad \Phi_{ww} \lesseqgtr 0 \quad \text{as} \quad w \lesseqgtr w_f \tag{14}$$

The exogenously given level of investment imposes the upper limit to Q^d at any w since, if $Q^d > Q^s$

$$(1-s)Q^s + I < (1-s)Q^d + I$$

and thus,

$$Q^d = \frac{I}{s} = \max Q^d$$

Figure 1 shows one possible state of the output market at a given I. In any momentary situation, a given w will correspond to zero or non-zero excess demands in the output and labour markets (E_Q and E_N, respectively) such that (in terms of Figure 1):

$$E_Q \gtreqless 0 \quad \text{as} \quad w_1 \gtreqless w \gtreqless w_2 \tag{15}$$

$$E_N \gtreqless 0 \quad \text{as} \quad w \lesseqgtr w_f \tag{16}$$

It is obvious that neither w_1 nor w_2 will correspond to an SR equilibrium, once we assume that:

$$\hat{W} = k_1 \cdot E_N(w) \tag{17}$$

$$\hat{P} = k_2 \cdot E_Q(w;I) \tag{18}$$

where the hats indicate relative rates of change, and k_1 and k_2 are the speeds of adjustment in the two markets. Even at the given level of investment, there are many possible SR equilibria depending on the relative numerical values of k_1 and k_2, stable or unstable, but necessarily quasi-equilibria since, at the given I, we have $E_Q(w_f;I) < 0$ while $E_N(w_f) = 0$. Figure 2 shows one of the many possibilities. A short-run quasi-equilibrium, defined as:

$$\hat{w} = \hat{W} - \hat{P} = 0 \tag{19}$$

is determined at a real wage rate such that:

$$k_1 \cdot E_N(w_E) = k_2 \cdot E_Q(w_E;I)$$

where $w_f < w_E < w_2$. This is a stable quasi-equilibrium, as careful inspection of the diagram will indicate. However, we could also postulate different speeds of adjustment, even variable speeds of adjustment for both markets, and thus we generate the possibility for a great number of stable or unstable quasi-equilibria associated with the exogenously given level of investment. Finally, we can assume different exogenously given levels of investment (as corresponding to alternative rates of interest or psychological propensities to invest), and the possibilities for a short-run quasi-equilibrium are enormously increased. For example, Figure 3 shows the case where in the output market, the exogenous elements (investment, but also net government spending) are so great that there corresponds a positive E_Q at any w. In this case we may have an unstable quasi-

equilibrium at some $w < w_f$, involving positive excess demands in both markets.

At this point we can generalise: In the context of our non-Walrasian model, the short-run equilibrium is neither necessarily unique nor necessarily stable. It will be a full-equilibrium only at w_f, where both markets are cleared, but it will be a quasi-equilibrium at any $w \neq w_f$ which is such that it will involve necessarily either positive or negative excess demands in both markets. If an SR equilibrium exists, it will have these properties. The analysis, however, suggests that the most crucial factors in determining the nature of the SR equilibrium are the exogenous elements of effective aggregate demand. These elements can be, theoretically at least, appropriately manipulated so that a short-run full-equilibrium may be attained. For this purpose we can mobilise our familiar tools of monetary and fiscal policy, such as changing the rate of interest or the net deficit of the governmental budget. The flexibility and effectiveness of such policy measures is so well known a field of dispute and inquiry that we need not enter it here. We only mention these factors in order to show that our "simple" model is indeed potentially rich in implications. One final observation of the SR equilibrium: any quasi-equilibrium, with either positive or negative excess demands in both markets (i.e. either an inflationary or deflationary quasi-equilibrium), will be such that the actual level of labour employment will be smaller than the maximun level of employment implied by equations (1) and (5) and, likewise, the actual level of output production will fall short of its maximum as well. A quasi-equilibrium, whether inflationary of deflationary, is associated with under-utilisation of the capacity of the economy. It is a "disequilibrium" situation characterised by "disorder".

III

The long-run analysis takes the sequence of any initial short-run full-or-quasi-equilibrium, as the latter is affected by capital accumulation and population growth. The short-run price-adjustments were determined on the basis of some given supply and demand schedules in the two markets, the full equilibrium corresponding to their intersections. Whatever the nature of the SR equilibrium may be, in the long-run analysis a different set of price-adjustments, conditioning the long-run quantity-adjustments, will be generated as these schedules (and their supposed points of intersection) shift. We now have to change the notation to some extent, and introduce a more complete "production function" such that:

$$Q = F(X, K) \qquad (20)$$

where K is now the capital stock, and X is the level of labour employment. Assuming, for convenience, that equation (20) is linear homogeneous in both inputs, we can write it in its intensive form as:

$$y = f(\varepsilon) \quad \text{with } f'(\varepsilon) > 0, \quad f''(\varepsilon) < 0 \qquad (21)$$

where y is Q/K, the output-capital ratio, and ε is X/K, the labour employment-capital ratio. Obviously ε is the per unit of capital desired level of labour employment from the part of the firms. When in the SR equilibrium the labour market is either cleared or characterised by excess supply, the profit maximizing condition

$$f'(\varepsilon) = \frac{W}{P} \qquad (22)$$

is satisfied, and thus ε is the actual labour employment-capital ratio. If there is excess demand in the labour market, equation (22) is not satisfied, since labour employment is constrained by equation (1). In such case, equation (21) will give us the planned or desired output-capital ratio which will be greater than actually. In the long-run analysis, it is the desired employment (from the part of the firms) which will be the source of a new pressure for price and quantity adjustments in the economy. Thus, condition (22), whether satisfied or not, will imply that the firms' desired ε will change depending on

$$\hat{\varepsilon} = A\,(\hat{P} - \hat{W}) \qquad (23)$$

where A is a positive constant or variable, depending on the elasticity of the $f'(\varepsilon)$ curve.

In the absence of inflationary expectations, output prices and money wages will change depending on the excess demand in the output and labour markets, respectively. In the long-run, however, the state of excess demands is influenced by capital accumulation and population growth. Population growth assumed at an exogenously given rate n, determines the availability of labour in the succession of SR equilibria. Capital accumulation determines several things: the productivity of employed labour, the available or potential output per head, and thus, indirectly, the productivity of capital and the firms' desired labour employment per unit of capital. On that basis we can postulate that, in any sequence of SR full - or quasi-equilibria,

$$\hat{P} = \alpha \left(\frac{I}{K} - \frac{S}{K} \right) \qquad \alpha > 0 \qquad (24)$$

where the difference between planned investment and savings per unit of capital measures the extent of excess demand in the output-market, with prices adjusting at a speed α. Generalising our savings (consumption) function, we assume that

S/K depends on income, so that:

$$\frac{S}{K} = s(\varepsilon) \qquad s'(\varepsilon) > 0 \qquad (25)$$

In the case of excess demand in the labour market, equation (25) implies that planned savings depend on the firms' planned output. The basic character of the long-run equilibrium and its implications are not seriously affected by this limitation in the interpretation of the variables because, as the careful reader will notice later on, the inflationary impact of the excess demand case will only be made stronger if we were to correct this limitation. For this reason, and for the sake of keeping the presentation somewhat simple, we keep (25) as the savings function. We also use ε for the computation of the productivity of capital (r), where:

$$r = f(\varepsilon) - \varepsilon . f'(\varepsilon) = r(\varepsilon) \qquad (26)$$

so that:

$$r'(\varepsilon) = -\varepsilon . f''(\varepsilon) > 0$$

At any given rate of interest, planned investment per unit of capital depends positively on the productivity of capital, so that:

$$\frac{I}{K} = i(\varepsilon) \qquad i'(\varepsilon) > 0 \qquad (27)$$

Substituting (25) and (27) into (24), we get:

$$\hat{P} = \alpha \left[i(\varepsilon) - s(\varepsilon) \right] = B(\varepsilon) \qquad (28)$$

where $B'(\varepsilon) \gtreqless 0$.

For the labour market, we assume, again in the absence of inflationary expectations, that money wages change depending on the excess demand for labour. In the long-run analysis, the excess demand for labour in a succession of short-run equilibria is measured by the divergence between the labour employment

(actual and/or desired by the firms) and the availability of labour. Thus,

$$\hat{W} = j \left[\frac{X - N}{K} \right] = j\,(\varepsilon - \upsilon) \qquad (29)$$

where υ is N/K, the labour-capital ratio, and N is the supply of labour at any time period. In other words, money wages vary inversely with the unemployment rate per unit of capital. Equation (29) can be linearised as:

$$\hat{W} = j_1\,(\varepsilon) + j_2\,(v)\ , \quad j_1'\,(\varepsilon) > 0, \quad j_2'\,(\upsilon) < 0 \qquad (30)$$

Substituting (28) and (30) into (23) we have that:

$$\hat{\varepsilon} = A \Big\} \ \alpha \left[i\,(\varepsilon) - s(\varepsilon) \right] - j_1(\varepsilon) + j_2\,(\upsilon) \Big\} = A_1(\varepsilon, \upsilon) \qquad (31)$$

The long-run analysis is dominated by a differential equation in terms of two endogenous variables, describing a quantity-adjustment derived from an interlocking system of price and quantity adjustments, as the long-run unfolds as the sequence of (W, P) determined in the successive SR equilibria, but now affected by the processes of capital accumulation and population growth.

These last two processes form the explicit basis for the second fundamental differential equations of our model, describing the time path of the other endogenous variable (υ). From its definition we have that:

$$\hat{\upsilon} = \hat{N} - \hat{K} \qquad (32)$$

We have fixed $\hat{N} = n$, and, to clarify its interpretation in terms of the events in the labour market, we may assume a constant labour participation ratio. The realised rate of capital accumulation ($\hat{K}$) is a linear combination of planned investment and savings, so that:

$$\hat{K} = \lambda \frac{I}{K} + (1-\lambda) \frac{S}{K} = \lambda . i(\varepsilon) + (1-\lambda) . s\,(\varepsilon) = G(\varepsilon) \qquad (33)$$

where λ is a constant such that $1 \geq \lambda \geq 0$. It then follows that $G'(\varepsilon) > 0$. Postulating equation (33) is necessary in order to cover sequences of SR quasi-equilibria, because in such cases the plans of the savers and those of the investors remain inconsistent and they cannot be both satisfied at the same time. Thus, the second differential equation of our long-run analysis is:

$$\hat{v} = n - G(\varepsilon) = \Lambda_2(\varepsilon, v) \tag{34}$$

The conclusion of the long-run analysis is the definition of a long-run of steady-state equilibrium, defined as:

$$\hat{\varepsilon} = \hat{v} = 0 \tag{35}$$

We will not enter here into the details of proving the existence, uniqueness, and stability of the long-run equilibrium. The reader can easily verify the following proposition: if a long-run equilibrium exists, it will be unique. Then, the time paths of the two endogenous variables (ε, v) will describe a stable focus, i.e. a convergence towards the unique long-run equilibrium if these conditions (the Ruth-Hurwicz conditions) are satisfied:

$$\left.\begin{aligned} -Aj_2'(v).\, G'(\varepsilon) &> 0 \\ \alpha i'(\varepsilon) &< \alpha s'(\varepsilon) + j_1'(\varepsilon) \end{aligned}\right\} \tag{36}$$

The above conditions are not too stringent to be satisfied, and thus we conclude that there exists a unique and stable long-run steady-state equilibrium, which inplies the determination of the steady-state values of the two endogenous variables $(\varepsilon_\tau, v_\tau)$, such that they define a steady-state rate of unemployment per unit of capital (u_τ)

$$u_\tau = v_\tau - \varepsilon_\tau \tag{37}$$

We must remember, at this point, that the long-run equilibrium is nothing else but the convergence to a perpetuated short-run full - or quasi-equilibrium. Once the system converges to such a steady-state, the characteristics of the short-run equilibrium will not change during the time sequence of its repetitions. The steady-state describes a sequence of invariable short-run equilibria. The question, therefore, is to examine what sort of such solutions the long-run analysis gives us, and what is the nature of the long-run equilibrium. And here, the long-run analysis confirms our conclusions of the short-run analysis, as, of course, it should be the case. More explicitly, the attainment of a long-run equilibrium implies that

$$\hat{\varepsilon} = 0 \quad \text{or} \quad \alpha \left[(i(\varepsilon) - s(\varepsilon) \right] = j(\varepsilon - \upsilon) \tag{38}$$

$$\hat{\upsilon} = 0 \quad \text{or} \quad \mathbf{n} = G(\varepsilon) \tag{39}$$

Depending on the steady-state values of the endogenous variables $(\varepsilon_\tau . u_\tau)$ we see from (38) that:

$$\hat{P} = \hat{W} \gtreqless 0 \quad \text{implies} \quad \varepsilon_\tau \gtreqless \upsilon_\tau \quad \text{or} \quad u_\tau \lesseqgtr 0 \tag{40}$$

This conclusion verifies the short-run analysis: if the short-run equilibrium is a full-equilibrium, then the steady-state rate of unemployment is zero. If however, the long-run equilibrium is the sequence of an invariable short-run quasi-equilibrium, then we shall have either positive or negative excess demands in both markets, and thus a non-zero steady-state rate of unemployment. Strictly speaking, of course, u_τ is non-negative, but to say that u_τ is negative would indicate those situations where price stability would be brought about only if the planned excess demand in the labour market (and thus in the output market as well) is eliminated. The short-run analysis indicated that:

$$\hat{P} \gtreqless \hat{W} = 0 \quad \text{as} \quad w_E \lesseqgtr w_f \quad \text{implying} \quad E_Q = E_N \gtreqless 0 \tag{41}$$

Obviously, (41) and (40) are directly connected, because the steady-state character of a perpetuated short-run equilibrium is such that:

$$E_Q = E_N \gtreqless 0 \qquad \text{implies} \quad u_\tau \lesseqgtr 0 \tag{42}$$

Figure 4 shows the relationships in (41), while Figure 5 shows the relationships in (40). The ZZ curve in Figure 5 looks like a Phillips Curve, and its curvature could be established if we knew the second derivatives of the functions involved. For example, we could assume that:

$$\hat{W} = j\,(\varepsilon - v) = \xi\,(u), \quad \xi'(u) < 0 \tag{43}$$

with $$\xi'(u) \to \begin{cases} +\infty \\ 0 \end{cases} \qquad \text{as } u \longrightarrow \begin{cases} \bar{u} \\ +\infty \end{cases}$$

where $\bar{u}$ can indicate a maximun excess demand for labour, above which money wages explode upwards at an infinite speed. The curvature of the ZZ curve is, however, relatively less important than the conclusion we draw from the analysis: in the absence of inflationary expectations, the ZZ curve (the "Phillips Curve") will have to pass through the origin.

IV

Whether the economy will be in full-equilibrium (with price and wage stability and zero unemployment) or in quasi-equilibrium (with price and wage instability and non-zero unemployment), is, to a great extent, the responsibility of the authorities in their timely and appropriate use of the tools of economic policy, monetary and fiscal. The preceding analysis shows, however, that the economy, if left by itself, can be in disorder, that it does not necessarily tend towards the harmony of the neoclassical general equilibrium. Disequilibrium or disorder is an admissible state of affairs. We further know, from the numerous studies in that field, that economic policy may, under certain circumstances, contribute to the disorder in the economy as well. Especially since capitalism, in the twentieth century, made its historic compromise with government intervention and the idea of the welfare state, the state of the economy is very much under the impact of the whimsicalities of the political trends. The economy may find itself at any point on the ZZ curve, but on which particular point it will be depends on the state's economic policy. This is the conclusion of our analysis so far.

For those who still believe in the "economics of order", there are, unfortunately, other elements which contribute not only to strengthening the admissibility of disorder, but also to making the task of stabilising the economy by means of policy more difficult and elusive than what one would like to believe. Contrary to the simple world of neoclassical theory, we live in a world where we have not only extensive governmental intervention, but also

widespread non-competitive or monopolistically competitive markets. The functioning of perfectly competitive markets could not possibly be seriously affected by the expectations of "small" and "identical" economic units. The impersonal price mechanism, the impersonal market forces "are" the rules of the game. But today, in a world of oligopolies, multi-national corporations, and labour unions, the expectations of the economic units (firms and unions) do affect the price mechanism. The market forces are no longer truly impersonal, since there exist many economic units or groups that have enough "monopolistic" power to affect their respective markets. This feature of modern industrial economies we shall try to incorporate in our analysis in a rather simple way, by introducing inflationary (or deflationary) expectations which have an impact on the agents' behaviour and, thus, on the state of the economy as well. On the one hand, we postulate an expected rate of money wage changes ($\hat{W}_e$) which concerns the firms and affects their pricing policies. The price level changes not only depending on the excess demand for output, but also if the firms expect wage increases, which they pass on to the prices of their output. So:

$$\hat{P} = \alpha . E_Q + \hat{W}_e \qquad (44)$$

On the other hand, we have an expected rate of price level changes ($\hat{P}_e$) which concerns the workers (and their unions) and affects their claims for money wages. Thus, money wages change not only depending on the excess demand for labour, but also if the workers (their unions) expect prices to change and adjust their wage claims accordingly. Thus,

$$\hat{W} = \xi (u) + \hat{P}_e \qquad (45)$$

In combining equations (44) and (45) we introduce in our analysis the so-called "demand-pull", "cost-push", and "mark-up" elements of inflation. The

nature of the steady-state long-run equilibrium, is now changed, because

$$\alpha \cdot E_Q + \hat{W}_e = \xi(u) + \hat{P}_e \qquad (45A)$$

We now denote by Π_τ the steady-state rate of inflation as

$$\hat{P} = \hat{W} = \Pi_\tau \qquad (46)$$

We do not have to postulate any connection between $\hat{W}_e$ and $\hat{P}_e$, but the unions' inflationary expectations appear to be the dominant factor in determining the nature of the long-run equilibrium. In fact, equation (45A) implies that:

$$\text{at } \Pi_\tau = 0, \qquad u_\tau \gtreqless 0 \qquad \text{as} \qquad \hat{P}_e \gtreqless 0 \qquad (47)$$

and

$$\text{at } u_\tau = 0, \qquad \Pi_\tau \gtreqless 0 \qquad \text{as} \qquad \hat{P}_e \gtreqless 0 \qquad (48)$$

What conditions (47) and (48) imply is that in the presence of non-zero (inflationary or deflationary) price change expectations, the ZZ curve will not pass through the origin. Instead, as Figure 6 shows, the ZZ curve will intersect the positive halves of the Π_τ and u_τ axes if we have inflationary price expectations, and it will intersect their negative halves if we have deflationary price expectations. The position (height) of the ZZ curve will depend on the numerical value of $\hat{P}_e$, and increasing inflationary expectations push and shift the ZZ curve to the right, and vice versa. These conclusions are in complete agreement with the recent theoretical explanations of the Phillips Curve, which attempted to prove the existence and stability of the trade-off line between inflation and unemmployment on the basis of micro-behaviour influenced by expectations. These theoretical studies are synthesised by Phelps, who is himself one of those who built up that approach. Like these micro-foundations studies, which implicitly recognise the possibility of quasi-equilibrium, we have shown here that a kind of Phillips Curve inverse relationship between the steady-state rates of inflation

and unemployment will exist in the northeast quadrant if there exist positive inflationary expectations.

Until this point, such expectations were introduced in the analysis in a rather arbitrary way. One would certainly have to go farther back in the history of an economy in order to explain the initial appearance of non-zero price expectations. Economic theorists are in disagreement as to what is a correct theory of expectations, and that issue is obviously beyond our present purpose. A more modest and sound attempt is to reduce this arbitrariness by introducing a link between current expectations and the more-or-less recent past experience of those who hold expectations. For this purpose we postulate that expectations are adaptive, according to a simple formula:

$$\hat{W}_e\,(t) = b_1 \left[\Pi_\tau\,(t\text{-}1) + \hat{W}_e\,(t\text{-}1)\right] \tag{49}$$

$$\hat{P}_e\,(t) = b_2 \left[\Pi_\tau\,(t\text{-}1) + \hat{P}_e\,(t\text{-}1)\right] \tag{50}$$

where t and t-1 refer to the current and the preceding time periods, respectively, while b_1 and b_2 are positive finite constant coefficients of adjustment bounded between 0 and 1. In order to simplify the analysis we assume that $b_1=b_2$ (although firms and unions may have different adjustment coefficients depending on how relevant information is available to either group, or on either group's perception and effectiveness or market or political power to realise their claims). To examine if adaptive expectations cause shifts in the ZZ curve, we shall examine what happens to the steady-state rate of inflation corresponding to $u_\tau = 0$. Without compromising the general validity of the argument, to take this point is particularly convenient since from (48) we know that corresponding to:

$$u_\tau = 0, \text{ at any } t, \quad \Pi_\tau = \hat{P}_e \tag{51}$$

Since the long-run equilibrium is such that:

$$g(u) = \alpha.\Pi_Q + (\hat{W}_e - \hat{P}_e) \tag{45a}$$

we have, using (51), that:

$$\hat{W}_e(t) - \Pi_\tau(t) = b\left[\hat{W}_e(t-1) - \Pi_\tau(t-1)\right] \tag{52}$$

Solving for $\Pi_\tau(t)$, and using again (49) and (51), we can easily prove that:

$$\Pi_\tau(t) = 2b.\ \Pi_\tau(t-1) \tag{53}$$

Equation (53) gives us the $\Pi_\tau(t)$ corresponding to $u_\tau = 0$. Thus,

$$\Pi_\tau(t) \gtreqless \Pi_\tau(t-1) \qquad \text{as} \quad b \gtreqless 1/2 \tag{54}$$

So that if $\Pi_\tau(t) > (t-1)$, thw ZZ curve will shift to the right continuously, while if $\Pi_\tau(t) < \Pi_\tau(t-1)$, the ZZ curve will shift to the left continuously converging towards a position such that $\Pi_\tau = 0$ at $u_\tau = 0$. In other words, starting from any ZZ curve corresponding to positive inflationary expectations, the ZZ curve will shift continuously to the right (upwards) if these expectations are of an explosive nature ($b > 1/2$). If the expectations are of a damped nature ($b < 1/2$), the ZZ curve will shift continuously to the left (downwards) towards its limiting case, i.e. passing through the origin. Finally, if these expectations are of a stationary nature ($b = 1/2$), the adaptiveness of expectations will not affect the position of the ZZ curve. Non-stationary inflationary expectations do affect the stability of the inflation-unemployment trade-off.

In our analysis, disorder is not only admissible, but it can also be aggravated to the extent that economic units or groups, or even socio-economic classes, have enough power to see their expectations affecting the market mechanism. The effectiveness of traditional monetary and fiscal policy is now conditioned by these factors, which may in fact render economic policy hopeless

by worsening the terms of the trade-off. It is not a simplistic exaggeration to say that the numerical value of coefficient b (and perhaps the differential values of coefficients b_1 and b_2) is quite crucial in determining the stability of the economy and the degree of uneasiness among the social classes. The existing studies on hyperinflations indicate the futility of any attempts of controlling running-away prices, as well as the political upheaval following such economic disorders. The recent phenomenon of stagflation, i.e. the combination of rising prices and under-utilisation of resources (including labour), is a manifestation of disorder. It has happened, and economic theory must at least accept its theoretical possibility. The pursuit of order and stability in terms of traditional policy measures may be proved not only elusive but also self-destructive, if the excessive inflationary claims become validated in an attempt to check unemployment, thus fueling the mechanisms that would make the forthcoming trade-offs worse.

One would look deeper in the structure of modern economies to understand the roots of disorder and the ingredients of a solution. To break the explosiveness of inflationary expectations is a first clue. It has been the fundamental reason behind the various schemes of wage and price controls adopted temporarily by many governments. In periods of rising general prosperity, such as the 1960's, disorder in the industrial economies was either minimal or, at best, created a euphoria. For many reasons that we may not discuss here, the 1970's are a different time period. The question of rising prosperity for all is now ambiguous. In unplanned, decentralised economies, disorder can be manifested openly. It is the consensus of the thoughtful observers that the most important economic question of the next decade will not be one of pursuing unlimited growth, but instead one of stabilising the socio-economic systems and

achieving a more just distribution of national incomes. The proposals of agreeing in a "social contract", in which the different socio-economic groups will limit their claims within certain defined boundaries, have some validity in terms of a disequilibrium analysis. At least, such a policy, if indeed observed in its mutuality, may stabilise the expectations-adjustment coefficient, something that the temporary price and wage controls cannot achieve.

V

The contribution of the disequlibrium theories and models developed in the last ten years towards a better understanding of economic phenomena cannot yet be fully evaluated, since the relevant research is still going on. But there are certain aspects of the theoretical approach presented here that are worth emphasizing. First, a new look in some purely theoretical questions. The abandonment of the need to construct models where all activities take place at market clearing prices. The re-questioning of the stability of the neo-classical full-employment equilibrium. A macro-derivation of a theoretical Phillips Curve, whose stability depends on expectations and their volatility. These are not new problems, and economists have made important inroads in analysing such phenomena, but the contribution of the disequilibrium approach may be that it helps towards developing a more general economic theory. There are many hidden or obvious shortcomings in the analytical details, and the existing literature is still full of "heroic" assumptions, but in combination with parallel research efforts (like the work on the micro-behaviour of the labour market participants, for example), it could provide the basis of a more realistic macroeconomic theory. Second, a recognition from many academic economists of the fact that western industrial economies can be in disorder. Disequilibrium phenomena are not necessarily transitory, but instead are inherent manifestations of unplanned economic systems. Economic policies, in the traditional "duo" of monetary and fiscal policy, are not always successful, especially if economic disorder generates expectations for its continuation

and worsening. Something new may be needed, and the disequilibrium models cry out for such a need,without yet being ready to propose something specific. Although we barely mentioned here the monetary or financial aspects of an economy in disorder, important progress may soon be made in that area as well, as the work of such economists as Hyman Minsky and Paul Davidson promises. Third, the disequilibrium approach has a significance in the history of economic thought, in combining the Keynesian principle of effective demand with the clearer methodology of the Scandinavian macroeconomists who, themselves, worked with a similar spirit. To the extent that a new theoretical approach makes economic theory less un-historic, this is only achieved by presenting an abstract view of reality such that the former does not violently contradict the basic characteristics of the latter. In many corners it has become fashionable to criticise pure neoclassical thoery (despite the fact that it is not easy to find such purists), and the criticism is basically right. What we need, however, is not just a negative attitude towards theory, but a better theory. To this, the disequilibrium approach may contribute, and that will fully define its significance.

FIGURE 1

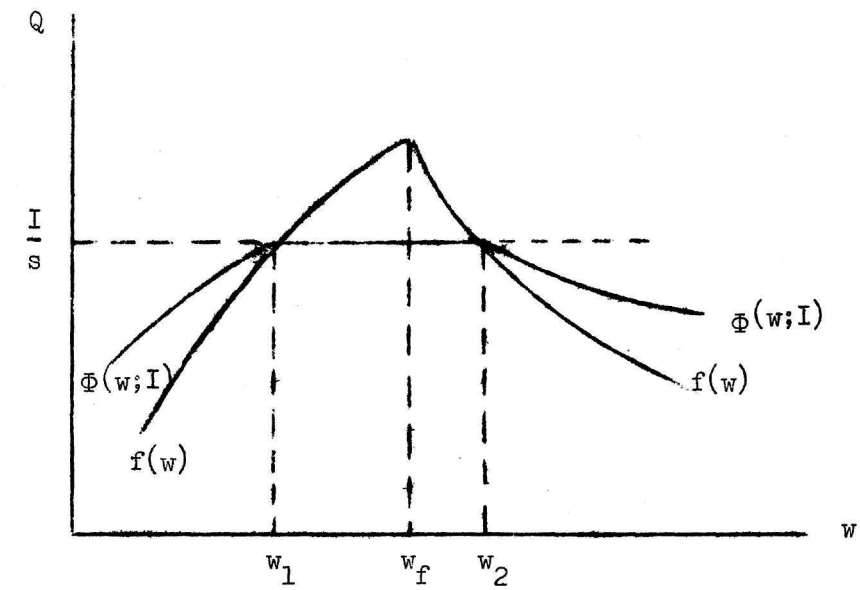


FIGURE 2

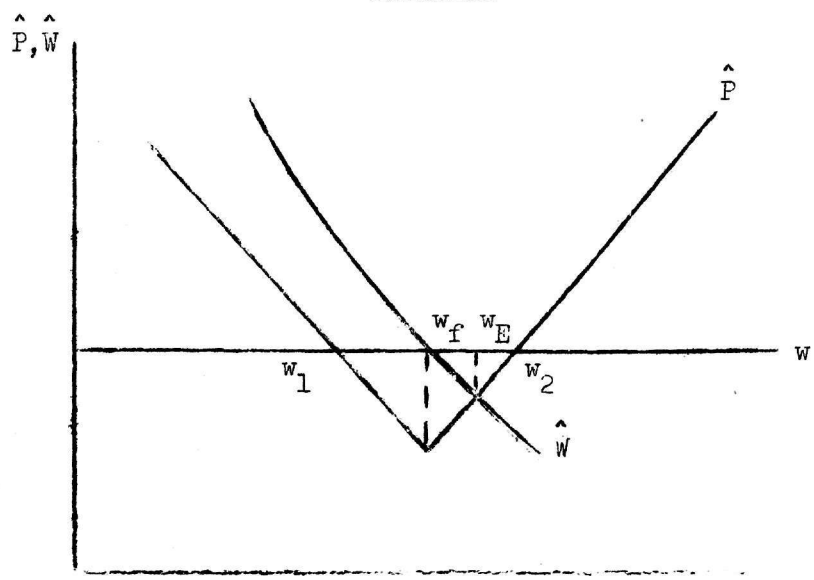


FIGURE 3

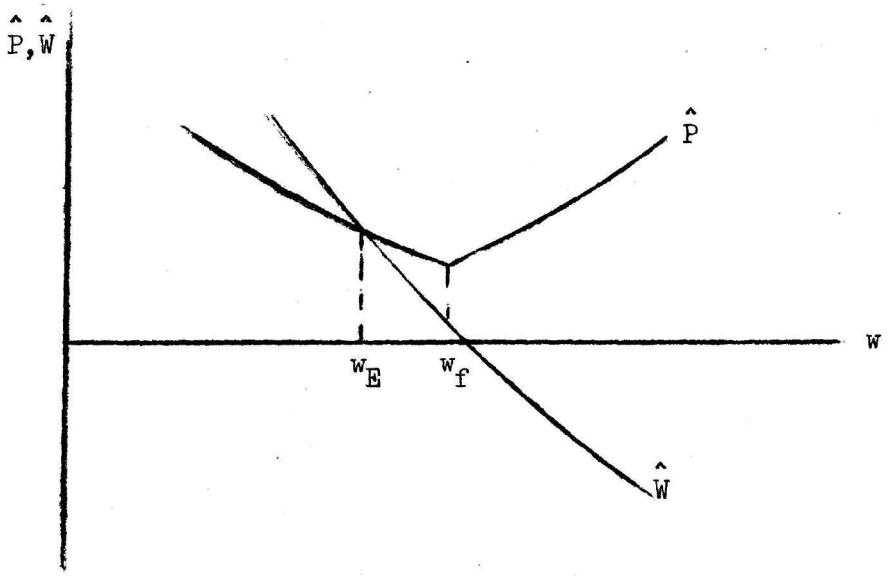


FIGURE 4

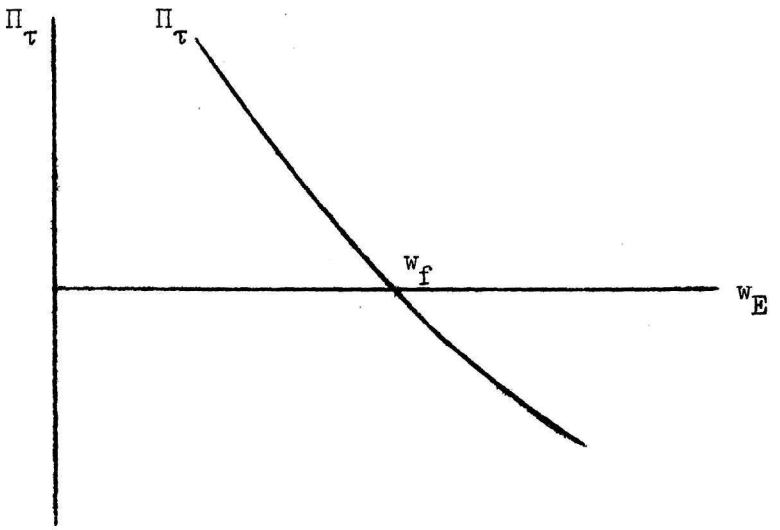


FIGURE 5

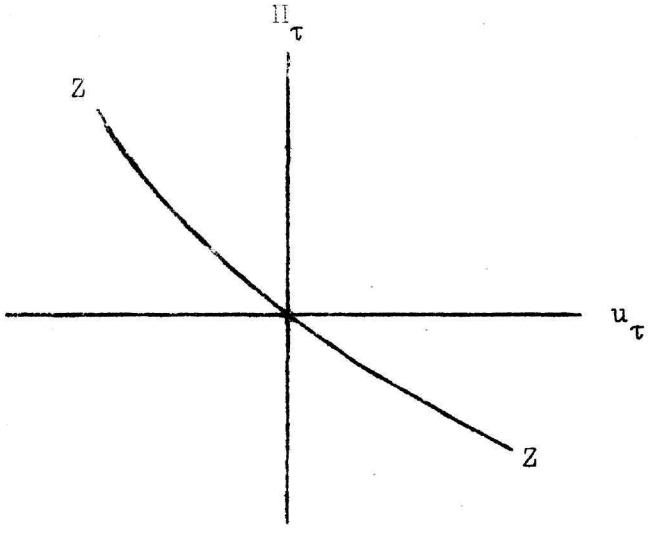
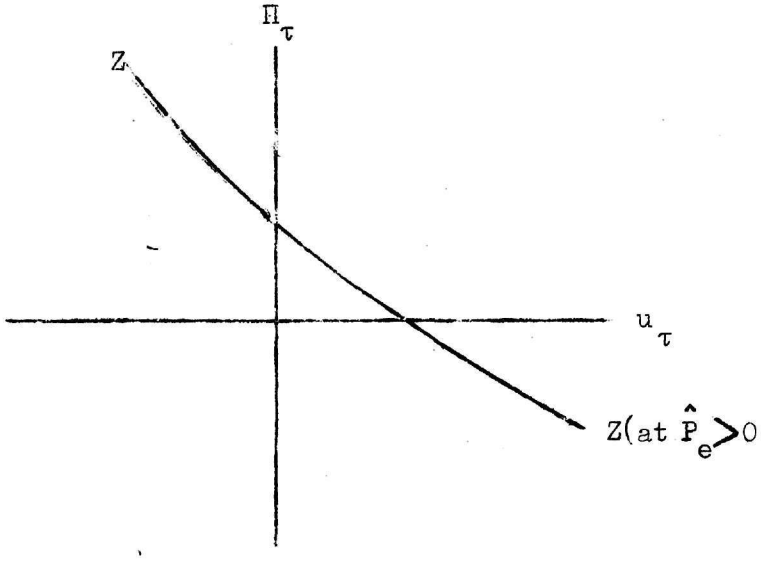


FIGURE 6



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