DEPARTAMENTO DE ECONOMIA
PUC/RJ

TEXTO PARA DISCUSSÃO
NO. 264

"A POST KEYNESIAN THEORY OF GROWTH, INTEREST AND MONEY"[1]

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Junho 1991

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[1]The authors are grateful to Geoff Harcourt to his helpful comments on an earlier draft.

Summary:

This paper examines the central features of the post Keynesian approach to growth, distribution, interest and money by discussing the analysis of class distinctions and conflict, the pervasive influence of uncertainty, and the role of money and interest in the economy. Drawing on this discussion it then develops a simple model along the lines of Pasinetti's models to examine the determination of the rates of accumulation and inflation and the distribution of income and wealth in capitalist economies. Using the model it examines the implications of a rise in the interest rate.

Resumo:

Este trabalho examina as principais características da abordagem pós-Keynesiana sobre crescimento, distribuição, juros e dinheiro; discutindo a análise das distinções e conflitos de classes, a penetrante influência da incerteza e o papel do dinheiro e dos juros na economia. Com base nessa discussão é desenvolvido um modelo simples ao longo das linhas de Pasinetti com o intuito de examinar a determinação das taxas de acumulação e inflação e a distribuição do rendimento e riqueza em economias capitalistas. Usando o modelo são examinadas as implicações sobre um aumento na taxa de juros.

1. Introduction

While firmly based in the classical tradition, the work of Luigi Pasinetti, together with that of Joan Robinson and Nicholas Kaldor, has laid the foundations of a post Keynesian approach to the theory of growth, interest and money. The approach is 'post Keynesian' in the sense that it combines elements of Keynes's (1936) ideas in the General Theory, as well as the extension of those ideas as developed in the last three decades by economists following the Cambridge tradition in Keynesian economics.[1] The purpose of this paper is to attempt to synthesize the post Keynesian contributions by providing a critical discussion of the conceptual elements of the approach, and by developing a formal model of growth in which monetary aspects are explicitly taken into consideration.

In our conceptual discussion (section 2), we shall emphasize the central elements of the post Keynesian approach, namely the roles of income distribution, uncertainty, money and interest in explaining the macroeconomic performance of capitalist economies, and the appropriateness of the notion of equilibrium as an instrument for analyzing these economies. Then, in sections 3 to 5, we shall develop a model of the determinants of accumulation, inflation and the distribution of income and wealth, to examine the impact of a change in monetary policy through its influence on the rate of interest. The examination of these effects in the short period is a part of the Keynesian literature, but the extension of the analysis to the long period still lacks a deeper discussion.

2. Elements of the Post Keynesian Approach

In this section we discuss some central elements of the post Keynesian approach. While it is beyond the scope of this paper to discuss the many different aspects of post Keynesian analysis, we comment on a few important issues which are of particular relevance to the long-period analysis of growth, money and interest. We discuss, in turn, the post Keynesian attitudes towards the importance of class distinctions, uncertainty, and money and interest.

The post Keynesians have followed the classical approach in emphasizing the distinction between classes, especially between profit-receivers and wage-earners. One aspect of this distinction is the so-called Cambridge savings assumption. Kaldor (1955-56) assumed that the propensity to save out of wages was lower than the propensity to save out of profits. Pasinetti (1962) went more directly to the distinction between the two classes, assuming that wage-earners had a lower propensity to save than did profit-receivers. This assumption implies that income distribution became closely connected with the rate of capital accumulation and growth in the economy, and this idea has become a standard feature of post Keynesian analysis. A second aspect of this distinction leads to the explanation of income distribution and inflation in terms of the conflict between classes. With its roots in Marx, this approach has been developed in a variety of Marxist, structuralist and post Keynesian contributions: the attempts by different classes to garner a larger share of income results in inflation, and the

relative strength of the different classes determines income distribution.[2] The focus on these distinctions and the analysis in terms of class behaviour is diametrically opposed to the methodological individualism of neoclassical economics.

Uncertainty plays a crucial role in the writings of the post Keynesians, particularly those who stress that economic behaviour takes place in historical time which flows from an irreversible past to an unknown future. Unlike in neoclassical economics, in which uncertainty is treated as actuarily calculable risk, the post Keynesians emphasize that important economic decisions are made on the basis of expectations about the future based on extremely flimsy foundations. Both the persistence of unemployment and macroeconomic instability can be seen to be the result of uncertainty.[3] In the face of great uncertainty, and therefore difficulty in anticipating the probable profitability of investment, firms prefer to hold their wealth in liquid form; likewise, economic decision-makers in general tend to turn to liquid assets (money in the limit), and postpone their expenditure in goods. This reduces the demand for labour, and results in unemployment. Fluctuations in the rate of employment, prices and other economic variables may also reflect the effect of uncertainty as economic decision-makers change their plans due to changes in their degree of confidence in their beliefs regarding the future.

In recognizing the importance of uncertainty, we can be led to one of two views on the relevance of modelling using equilibrium analysis. One is to see uncertainty as a continuously altering the

values of the parameters affecting the behaviour of decision-makers, thus rendering attempts at modelling completely futile. The other is to take the view that in the face of uncertainty economic decision-makers resort to the use of conventions and rules of thumb, which make the behavioural parameters relative stable, thereby making economic behaviour particularly amenable to mathematical modelling.

According to the former view, which is subscribed to by several post Keynesians, the economic system is in permanent flux, and models employing the notion of equilibrium are inappropriate instruments for the analysis of actual economic processes. In other words, equilibrium is inconsistent with the analysis of capitalist economies in which there is no tendency towards a tranquil state.[4] While it is an important insight that the economy is always in a state of flux and never in a tranquil state, so that economic decision-makers are always subject to uncertainty, it does not necessarily follow, however, that models employing equilibrium analysis are flawed. Equilibrium models are not supposed to describe the path of the system over calendar time, but are organizing instruments which highlight the interrelation between the relevant variables at each point in time, under the (admittedly unrealistic) assumption that the parameters are unchanged. Since the parameters can change in a manner unknown to economic decision-makers, they do not find themselves in a tranquil state. Equilibrium analyses are of special interest if the models are able to trace the path of the system over a series of partial or short-

period equilibrium situations, using dynamic analysis. It is even possible that the economy may tend to a position of long-period equilibrium in some sense, but in any event the analysis cannot be faulted in ignoring history and in failing to take into account short-period features of the economy, including the influence of uncertainty. According to the latter view modelling becomes no more than an exercise in understanding the interactions between economic variables based on the notion that the there is a certain degree of stability and regularity in the decision-makers' behaviour. The behaviour most discussed in post Keynesian theory are firms' pricing and output behaviour, and investment behaviour.

In modelling the firms' pricing and output decision, one alternative is to assume that firms maximize profits at an expected price, given the nominal price of its inputs.[5] While some post Keynesians have followed this approach in their expositions of Keynes's General Theory analysis, the more popular approach is to follow Kalecki (1971) in assuming that firms set the price as a fixed mark-up over variable costs, and adjust to unexpected changes in demand through changes in the levels of output. In Kalecki's formulation, the mark-up depends on the degree of monopoly of the industry and the bargaining power of labour in fixing the money-wage, and recent attempts to model the determination of the mark-up take into account the distributive conflict between the firms' desired mark-up and the wage-earners' desired real wage.[6]

Firms also form expectations in order to decide the level of investment. In an advanced capitalist economy, firms have access

to credit, and the decision to invest is relatively independent of the level of current saving. Indeed, the independence of investment in relation to saving is at the root of the explanation of fluctuations of output, employment and prices. In the post Keynesian tradition firms are assumed to follow the rule of thumb of making their investment depend on the rate of profit, the cost of 'finance' (the rate of interest), and the rate of capacity utilization.[7]

Finally, we turn to money and interest. As noted already, money (and quasi-monies) play a central part in the way decision-makers protect their wealth against uncertainty, and in the explanation of unemployment and instability. According to the post Keynesian view, when the decision-makers' preference to maintain wealth in liquid form increases, the banking system will supply the additional demand for liquidity. The post Keynesian notion of an 'endogenous money supply' is based on the fact that the banking sector, with the Central Bank in its role as lender of last resort behind it, will supply any amount of credit desired by the economy at a given level of the interest rate.[8] If the Central Bank chooses to limit the growth of liquidity it can do so by increasing the interest rate by moving upwards its discount rate. Hence, the rate of interest is seen as a central parameter in the post Keynesian approach.

The interest rate can be seen to be closely related to several of the other issues with which post Keynesians are concerned. First, it is related to the distinction between classes. We have

commented already on the theory of conflict in which inflation is the result of the conflicts between the different classes. A third group can be introduced into the analysis of this distributive conflict, namely, the banking system: given the money-wage rate, firms and banks would battle over the surplus, and if firms wish to fix the level of the net profit margin (above interest charges), an increase in the interest rate will imply an increase in the price level. The change in the price level, as well as the change in the rate of interest which caused it, will redistribute incomes between different groups and this, due to the differences in saving propensities discussed above, would have an impact on the level of economic activity and hence, on the rate of capital accumulation. This effect will depend in part on the nature of class ownership of different assets. While Pasinetti (1962) initially assumed that both profit-receivers and wage-earners could hold capital which yielded the same return, later contributions have taken differences in the assets held by the two groups into account.[9] Second, it is related to the behavioural rules that firms follow in an uncertain environment. As just mentioned, firms may push up prices when the interest rate rises; moreover, they may reduce their rate of investment due to changes in the cost of credit.

The analysis of changes in the rate of interest or the supply of money is a commonplace in short-period models. They are not as common in long period models, and in recent contributions, Taylor (1985, 1988) and Skott (1988) are notable exceptions. In

considering the effect of exogenous changes in the rate of interest, a central question is the extent to which we could refer to a theory of the long period rate of interest. Keynes was quite confident that the monetary authorities are capable of affecting the long period position of the economy.[10] In the contributions of Pivetti (1988) and Panico (1985, 1988) the notion that the monetary authority can fix the rate of interest is expanded and turned into an argument to substantiate Sraffa's (1962, p. 33) argument that the long period rate of profit is "susceptible of being determined from outside the system of production, in particular by the level of the money rates of interest."[11] Thus, according to this approach, the long period rate of interest depends on the structural factors determining the state of liquidity preference, the management of the public debt, the international rates of interest, and most importantly in a relatively closed financial system, the monetary policy of the Central Bank.

3. Structure of the model

In this section we develop a model which seeks to bring together the central features of the post Keynesian analysis we have just discussed. We consider a closed economy producing one good with labour and capital (physically the same as the produced good) using a fixed-coefficients production function. For simplicity we abstract from government fiscal activity.

There are two classes in the economy - wage-earners and profit-receivers, and two types of institutions - firms and banks. Wage-earners derive their income primarily from wage income, but

since they also save a fixed fraction of their income and hold deposits with banks, they also earn interest income. Profit-receivers do not work, and own the firms through their ownership of stocks; since they also hold deposits their income comes from both interest and returns to stock-ownership. Profit-receivers also save a constant fraction of their income, but have a higher propensity to save than do wage-earners. Firms hire wage-earners to produce output. They operate with excess capacity in an oligopolistic environment, set their price as a markup on labour costs 'a la Kalecki (1971), and produce according to demand. They also make investment decisions according to the size of excess capacity and the interest rate. Finally, banks borrow funds from depositors (wage-earners and profit-receivers) and lend to the firms. They are assumed usually to operate with excess reserves and supply credit according to the demand for it; if they ever run out of reserves they are assumed to have access to loans from the Central Bank at a fixed interest rate (determined by its monetary policy). For simplicity we assume that banking is costless, and the interest rate charged by the banks is equal to the rate at which they can borrow.

We may examine the structure of the model by describing in turn the asset market, the labour market and pricing side of the economy, and the goods market.

For the asset market, the asset balance sheets for the four groups is given by:

Banks	
H - reserves L - loans	D - deposits

Firms	
PK - physical capital	L - loans P_eE - equity

Profit-receivers	
D_c - deposits P_eE - equity	W_c - wealth

Wage-earners	
D_w - deposits	W_w - wealth

where P is the price level, K is the physical stock of capital, P_e is the price of equities and E the volume of stocks. Note that all high-powered money is held as bank reserves, and that wage-earners hold their entire wealth as bank deposits (perhaps because the holding of stock is too risky for them).[12] Noting that $D = D_c + D_w$ these balance sheets imply that

$$H + PK = W_c + W_w \equiv W$$

where W denotes total wealth. Assume that the profit-receivers choose to allocate a fraction σ of their wealth to deposits, and that this fraction depends (positively) on the interest rate, i (among other variables which are ignored for simplicity).[13] Assume that the stock of deposits of wage-earners is given, demand supply balance for deposits is given by

$$H/\mu = \sigma(i)(H + PK) + [1-\sigma(i)]D_w$$

where μ is the reserve-deposit ratio of the banks. We assume that the interest rate is fixed and that this equation is satisfied through variations in μ (which is possible because banks operate with excess reserves) or through changes in H (as a result of bank borrowing from the Central Bank). These assumptions represent the post Keynesian analysis of endogenous money.

Turning next to the labour market and pricing, we assume that

at a point in time the money-wage, w, and the price, p, are given, and given Kalecki's pricing equation

$$p = (1+z)wa \tag{1}$$

where a is the fixed labour-output ratio, so is the markup, z. This equation implies that the real wage is given as

$$v = 1/[(1+z)a] \tag{2}$$

We assume that wage-earners have a desired or targeted real wage given by v_w which depends on the state of class struggle, treated as a parameter in our model, and that they push up the money wage over time when their desired real wage exceeds the actual one. We formalize this with the assumption

$$\hat{w} = \theta\,[v_w - v] \tag{3}$$

with $1>\theta>0$ and where hats over variables denote time rates of change. We assume that firms have a desired or targeted markup, which by (2) implies a desired real wage v_f, and that they push up the price over time when their desired markup exceeds the actual one. We formalize this with

$$\hat{p} = \pi\,[v - v_f] \tag{4}$$

with $1>\pi>0$.[14] Following Kalecki, we may assume that v_f depends on the extent of industrial concentration. But because firms also have to make interest payments out of markup income we assume that a higher interest rate will induce firms to desire a higher markup and hence a lower real wage. We assume that

$$v_f = v_o - v_1 i \tag{5}$$

to capture this effect.[15]

Finally, turning to the goods market, we assume that firms

distribute all profits to profit-receivers.[16] This, given our assumptions about profit-receivers and wage-earners, implies that the demand-supply balance equation is

$$X = (1-s_c)[(1-va)X-i(D_w/p)] + (1-s_w)[vaX+i(D_w/p)] + I \quad (6)$$

where X denotes output, I the level of real investment, and s_c and s_w (with $s_c>s_w$) the saving propensities of profit-receivers and wage-earners, respectively. Dividing through by K and rearranging, we can obtain the saving-investment equality condition

$$s_c[(1-va)u-i\delta]+s_w(vau+i\delta) = g^I \quad (7)$$

where $u=X/K$ is a measure of the degree of capacity utilization, $g^I=I/K$ is the rate of accumulation of capital, and $\delta=D_w/pK$ is the share of physical capital owned by wage-earners (through their holding of deposits).

Finally, we assume that firms have a desired accumulation function given by

$$g^I = \alpha + \beta u - \tau(i - \hat{p}) \quad (8)$$

As suggested by Steindl (1952) a higher rate of capacity utilization makes firms want to invest at a higher rate; the higher rate of capacity utilization also increases the rate of profit and this also encourages more investment.[17] A higher real interest rate is also assumed to reduce the rate of accumulation; for simplicity we do not distinguish between expected and actual rates of inflation.[18]

The behaviour of this model can be examined for the short and long periods. In the short period, we assume given values of D_w, K, p, and w, which imply given v and δ. In short-period equilibrium,

in which we assume that the goods market clears through variations in capacity utilization, the inflation rate can be determined from (4), and (7) and (8) then may be solved for u which is given by[19]

$$u = \{\alpha+[(s_c-s_w)\delta-\tau]i+\tau(v-v_f)\}/[s_c-(s_c-s_w)va-\beta] \quad (9)$$

Over the long period D_w, K, p and w change over time. Changes in p and w are shown by (3) and (4). Physical capital, for simplicity, is assumed not to depreciate, so that the change in capital stock is given by the rate of investment

$$\hat{K} = g^I \quad (10)$$

and since wage-earners only hold deposits, the increase in their deposits is given by their saving out of wage and interest income, so that

$$dD_w/dt = s_w(waX+iD_w)$$

which implies, upon division by D_w,

$$\hat{D}_w = s_w[(vau/\delta)+i] \quad (11)$$

The long-period behaviour of the economy can be analyzed by examining dynamic equations for v and δ.[20] From their definitions, we have

$$\hat{v} = \hat{w} - \hat{p} \quad (12)$$

and

$$\hat{\delta} = \hat{D}_w - \hat{p} - \hat{K} \quad (13)$$

Using equations (3) and (4), (12) can be written as

$$\hat{v} = \theta v_w+\pi v_f - (\theta+\pi)\, v \quad (14)$$

while using (4), (8), (10) and (11), (13) can be written as

$$\hat{\delta} = (s_w+\tau)i-\alpha+[(s_w va/\delta)-\beta]u-(1+\tau)(v-v_f)\pi \quad (15)$$

where u is given by (9). In long-period equilibrium, $\hat{v} = \hat{\delta} = 0$.

The long-period equilibrium value of v, obtained by setting $\hat{v} = 0$ in (14) is given by

$$v^* = [\theta/(\theta+\pi)]v_w + [\pi/(\theta+\pi)]v_f \qquad (16)$$

which is a weighted average of the real wages desired by the wage-earners and the firms, the weights depending on the rates at which the wage-earners and firms are able to adjust the money-wage and price, respectively, when the actual real wage is different from their desired one. The model can then be used for analyzing the implications of a change in monetary policy.

Rather than examine this model in detail we will seek to capture some of its important properties by examining two simple special cases in the next two sections.

4. Case where wage-earners do not save

One special case is the one in which wage-earners do not save, so that $s_w=0$ and $D=0$.

In this case, in the short period, given v, K and p, variations in the utilization of capacity bring about short-period equilibrium at which the demand for goods is equal to output. The determination of this equilibrium is shown in Fig. 1, where the g^I curve is the investment curve showing the relation between the investment-capital stock ratio and the capacity utilization rate which is given by equation (8) after substituting from (4), for given v, and where $g^S = s_c(1-va)u$, the left-hand side of (7) with $s_w = \delta = 0$, is the saving curve showing the relation between the saving-capital stock ratio and the capacity utilization rate. Given the short-period stability assumption, the g^S is steeper than g^I.

The equilibrium value is, from equation (9) given by

$$u = \alpha - \tau i + \tau(v - v_t)/[(1-va)s_c - \beta] \qquad (17)$$

A higher v pushes the g^S curve down by redistributing income towards wage-earners who do not save, while it pushes the g^I curve up by increasing the rate of inflation and thus reducing the real interest rate, as shown in equation (4). The result is a higher equilibrium u, as can also be verified from (17), and a higher rate of growth of capital. The positive relation between v and u is shown as curve IS in the upper part of Fig.2.

In the lower part of Fig.2 the $\hat{w}$ curve shows the inverse relation between the change in money-wage and the real wage given by the wage adjustment equation (3), and the $\hat{p}$ curve is the positive relation between the change in the price and the real wage given by the price-adjustment equation (4), given the rate of interest. Over the long period v moves according to equation (12). The figure shows this adjustment to be stable, and long-period equilibrium is achieved at $\hat{v} = 0$ when $\hat{w} = \hat{p}$, when, the long-period equilibrium value of v is seen to be given by (16). The long-period equilibrium value of u, u*, can then be seen from the upper part of the figure.

We may now examine the implications of a rise in i in the short period and the long period. In the short period, given v, the rise in i leaves the g^S curve unchanged in Fig.1, but it does shift the g^I curve. The effect depends on the effect on the real interest rate which, using (5), is seen to be

$$d(i-\hat{p})/di = 1-\pi v_1$$

where the first term is the direct effect on the nominal rate and the second term is the effect on the rate of inflation due to downward pressure on the desired real wage of firms as they desire a higher markup to compensate for higher interest costs. Since $\pi<1$, the condition that $v_1<1$ (or that the effect of the higher interest rate on the desired real wage of firms is small) is sufficient to make this expression positive, which we assume to be the case. Thus a rise in the nominal rate of interest increases the real rate as well (since inflation rises less than does the interest rate). The rise in the real interest rate therefore pushes the g^I curve down. The result is a fall in u and short-period equilibrium g. Note that since for any v the equilibrium u falls, the curve in the upper part of Fig.2 shifts downwards.

In the long period we have to take into account changes in v as well. The increase in i pushes the $\hat{p}$ curve in the lower part of Fig.2 upwards, as can be seen from equations (4) and (5). The long-period equilibrium value of v* therefore falls, while the long-period equilibrium rate of inflation rises compared to p*. The changes are given by

$$dv^*/di = -\pi v_1/(\theta+\pi)$$

and

$$dp^*/di = \pi\theta v_1/(\theta+\pi)$$

Since long-period equilibrium v falls and the IS curve shifts down, the long-period equilibrium value of u must also fall. It is also clear from the Fig.2 that the short-period impact on the inflation rate is higher than in the long period, while the short-period

impact on the rate of capacity utilization is lower than in the long period. These results imply that the long-period negative effect on the rate of accumulation is greater than in the short period. The reason for this is that in the short period the real wage is fixed, so that the fall in aggregate demand is due only to the higher real interest rate; in the long period the real wage falls, reducing aggregate demand further by causing a redistribution of income from wage-earners to profit-receivers, and also by reducing the rate of inflation below (and hence the real interest rate above) the level it reached in the short period after the interest-rate increase because the actual real wage now comes closer to the real wage desired by the firms.

The effect of a fall in the interest rate may turn out to be different. This may in part be because v_f may be zero when i falls, or at least different from its value when i increased. Firms - as a group - may try to capture some of the benefits of a lower interest rate for themselves. But in major part, a fall in i need not stimulate investment if the fall is small and firms believe market prospects to be bleak: r may this be small or zero when i falls. Post Keynesians will probably want to take account of these types of ratchet effects.

The implications of our analysis for the effectiveness of increasing the interest rate for raising the rate of growth in the economy, claimed by traditional neoclassical analysis, are not favourable. The traditional case for increasing the interest rate, in any case, is made by arguing that a higher interest rate will

induce savers to save more, and these types of substitutions have not been considered in our model since s_c has been taken to be fixed. However, if the higher interest rate induces profit-receivers to save more, so that s_c rises, the g^s curve of Fig.1 will be pushed up, so that short-period equilibrium u and g will fall more when i rises than when the saving effect was ignored, because the higher saving rate depresses aggregate demand further. The long-period depressive effects will also be greater. These results follow because in our model growth is demand-determined rather than determined by the supply of saving; only in the latter case could a higher rate of interest induce individuals to consume less and save more and increase the rate of growth of the economy.

5. When wage-earners save and earn interest

It may be argued that a higher interest rate may redistribute income from profit-receivers to wage-earners if the latter can save and earn interest on their wealth and profit-receivers earn interest as well as profit, as in the general model described in section 3. We now consider our second special case, in which we allow wage-earners to save, but assume that $v_1=0$, so that a rise in i has no effect on the real wage desired by the firms.

In this case the model is identical to the general one discussed in section 3 as long as the interest rate is assumed to be fixed. In the short period, for given values of w, p, K and D_w, which implies given v and δ, (9) solves for the short-period equilibrium value of u. The equilibrium can be depicted again as in Fig.1, although the g^s curve would now be given by the right-

hand side of equation (7).

In the long period v and δ move over time according to equations (14) and (15). The dynamics of the system in the long period can be portrayed using the phase diagram in Fig.3.

The $\hat{v}=0$ curve shows the value of v given by (16) which makes $\hat{v}=0$. Note that for $v<v^*$ $\hat{v}>0$, and for $v>v^*$ $\hat{v}<0$ from equation (14) so that the horizontal arrows are as shown.

The $\hat{\delta}=0$ line shows combinations of v and δ which make $\hat{\delta}=0$ in equation (15). To determine the slope of the line we examine the partials of $\hat{\delta}$ with respect to δ and v, respectively, holding $\hat{\delta}=0$.

Differentiating $\hat{\delta}$ partially with respect to δ and rearranging implies

$$\partial\hat{\delta}/\partial\delta = -(s_w va/\delta^2)[\alpha-\tau i+\tau\pi(v-v_f)]/[s_c-(s_c-s_w)va-\beta] - \beta(s_c-s_w)i/[s_c-(s_c-s_w)va-\beta] \qquad (18)$$

where the denominators of both terms are positive. If we assume that $u>0$ even for $\delta=0$, we have $\alpha-\tau i+\tau\pi(v-v_f)>0$ so that the entire expression is necessarily negative. A higher δ redistributes income from profit-receivers to wage-earners who have a higher propensity to consume, and by raising aggregate demand and capacity utilization this increases accumulation of physical capital by firms more than the saving of wage-earners increases due to their higher income, reducing $\hat{\delta}$.

Differentiation $\hat{\delta}$ now partially with respect to v and rearranging, we get

$$\partial\hat{\delta}/\partial v = s_w au/\delta - \pi(1+\tau) + [(s_w va/\delta)-\beta][(s_c-s_w)au+\tau\pi]/[s_c-(s_c-s_w)va-\beta] \qquad (19)$$

The first term captures the direct effect of an increase in the real wage for the wage-earners' saving for a given level of economic activity; it is positive. The second term captures the effects of the inflationary consequences of the higher real wage, both by direct erosion of wage-earners' wealth and by the acceleration the general rate of accumulation; it is negative. The last term examines the consequences of a rise in the level of activity resulting from the redistribution of income towards wage-earners brought about by an increase in the real wage. Since this tends to increase wage-earners' saving as a result of their higher income and it increases the rate of accumulation, the effect on δ is ambiguous in general. If δ is small the proportionate effect on wage-earners' savings is greater and the term is positive, and conversely if δ is large. It appears, then that this derivative cannot be definitely signed, although for larger δ a positive sign seems likely.

If (19) is positive, the $\hat{\delta}=0$ curve will have a positive slope as in Fig.3(a), while if it is negative the curve will be negatively sloped as in Fig.3(b). The vertical arrows are as shown in these figures since the expression in (18) is negative for both cases. Thus in either case the long-period equilibrium will be a stable one, with the starred values showing the long-period equilibrium values of v and δ.

The parameters of the model will determine which type of long-period equilibrium the economy will have. This can be seen using an alternative graphical depiction which measures u and δ on the

axes and fixing v at its long-period equilibrium level v* (which is determined only by (16)).

The short-period equilibrium level of u for v* and the associated level of inflation, $\hat{p}^*$ (obtained by substituting v* into (4)), is seen from (9) to be given by

$$u = [\alpha-\tau(i-\hat{p}^*)+(s_c-s_w)i\delta]/[s_c-(s_c-s_w)v^*a-\beta] \qquad (19)$$

This shows that for a higher level of δ the goods-market clearing level of u is higher (since $s_c>s_w$). This relationship is shown as curves IS in Fig.4.

Long-period equilibrium also requires $\hat{\delta}=0$. Setting $\hat{\delta}=0$ in equation (15) we get

$$u = [\alpha+(1+\tau)\hat{p}^*-(s_w+\tau)i]\delta/[s_wv^*a-\beta\delta] \qquad (20)$$

Depending on whether the parameters of the model (specifically, α, τ, π, θ, v_f, v_w, s_w and i) make $[\alpha+(1+\tau)\hat{p}^*-(s_w+\tau)i]$ positive or negative, the curve satisfying equation (20) will be as shown by the discontinuous $\hat{\delta}=0$ curve of Fig.4(a) or Fig.4(b), with the discontinuity occurring at $\delta=s_wv^*a/\beta$. In the first case, equilibrium δ is 'small' and the second it is 'large'. As one would expect, if wage-earners have a higher propensity to save they will, in the long period end up with a higher share of the physical capital both because they accumulate at a higher rate and the economy accumulates physical capital at a lower rate because of less favourable consumption conditions. Since we are assuming that $\alpha-\tau(i-\hat{p}^*)>0$ (so that $u>0$ even for $\delta=0$), the positive case appears to be more likely, although if $s_wi>\hat{p}^*$, the negative case cannot be ruled out.

We may now examine the implications of a change in the interest rate; we only examine the effects of an increase and the opposite case can be analyzed allowing for ratchet effects of the type we discussed above.

In the short period, equation (9) shows that

$$du/di = [(s_c-s_w)\delta-\tau_1]/[s_c-(s_c-s_w)va-\beta] \qquad (21)$$

which can take either sign. The likelihood of a positive effect is increased the larger is s_c-s_w and δ and the smaller is τ, that is, the larger is the expansionary consumption effect of a redistribution towards wage-earners brought about by a rise in the interest rate and the weaker the negative investment effect. The effect on the growth rate is given by

$$dg^I/di = \beta du/di - \tau$$

which may be negative even with $du/di>0$ in (21), although with a small τ a positive growth effect is possible. The distribution between wage and non-wage income is fixed in the short period.

In the long period, the effects can be examined from Fig.4. If i is small enough so that we have the case of Fig.4(a), a rise in i will shift down the $\hat{\delta}=0$ curve in the positive orthant (as is clear from equation (20)). The shift in the IS curve depends on the sign of the expression in (21). If it is positive so that the higher interest rate has a short-period expansionary impact, there will be a further expansionary effect in the long period and δ will be higher. This occurs because in the long period the wage-earners' share in capital (the relative size of their deposits) increases, further adding to consumption demand. Thus the expansionary effect

of an interest rate increase cannot be ruled out. In the short-period contractionary case the effects on u* and δ* are in general not possible to determine from the figure. For the case in Fig.4(b) the increase in i pushes the segment of the $\hat{\delta}$=0 curve in the positive orthant upwards, and thus the expansionary long-period effect again becomes a possibility, fuelled by a rise in δ over the long period.

We thus find that when wage-earners' saving is allowed for and wage-earners are allowed to earn interest income, a rise in the interest rate may expand utilization and even the rate of accumulation in the short and long periods, and shift the distribution of assets towards wage-earners. While this is a possibility, its likelihood diminishes if we take some further features of the economy into account.

First, in this section we have assumed that the interest rate does not have the effect of increasing v_f and therefore raising the inflation rate by equation (4). In the previous section we took this linkage into account and saw that an increase in the rate of interest reduced - in the long period - the real wage and therefore tended to reduce the rates of capacity utilization and accumulation. Incorporation of this effect will reduce the chances of an expansionary impact of a rise in the interest rate. Moreover, a higher rate of inflation in this model will have the effect of eroding the real value of wage-earners' deposits, and this will tend to reduce δ, further reducing the chances of any expansionary impact.

Second, throughout this paper we have assumed that the wage-earners' propensity to save out of interest income is lower than that of profit-receivers. It is likely, however, that wage-earners have a higher propensity to save out of interest income than out of wage income, especially if this saving is done for them institutionally by, say, pension funds. In this case the propensity to save out of interest income for wage-earners may exceed that of profit-receivers, so that redistributions from profit to wage-earners' interest income may have no positive consumption effects at all. This points out the importance of taking institutional factors into account more carefully before jumping to the conclusion that a higher interest rate may be expansionary.

6. Conclusion

In this paper we discussed what we believe are the central features of the post Keynesian approach concerning growth, distribution, interest and money, and attempted to incorporate them into a growth model in the Cambridge tradition - a tradition to which Pasinetti made essential contributions. The model highlights an aspect of capitalist economies which has not adequately captured the attention of post Keynesians, namely, the short period and in particular, long-period effects of changes in the monetary policy, or more specifically, the rate of interest.

In the model, following Keynes and Kalecki, output is demand driven, and aggregate demand depends on the decision to invest of firms and the decision to consume out of income of profit-receivers and wage-earners. Firms invest more the greater the degree of

capacity utilization, and the lower the real interest rate. In line with the formulations of Kaldor and Pasinetti, the propensity to save of profit-receivers is greater than that of wage-earners. Profit-receivers hold deposits and stocks whereas wage-earners only hold deposits which bear and interest which is fixed, perhaps by the Central Bank; the supply of money in endogenous at this fixed interest rate. Distribution and the rate of inflation are determined by distributional conflict between the different groups, and the rate of accumulation and growth is determined by the firms' investment behaviour, the saving parameters of the different groups, and the distribution of income.

The central implication of our model is that changes in the interest rate affect the level of investment and the distribution of income and wealth between profit-receivers and wage-earners, and thus the level of consumption. The effect of an increase in the rate of interest on the degree of utilization of capacity and the rate of growth in the long period is, in general, ambiguous. Keynesian short-period models, on the one hand, and neoclassical long-period models, on the other, predict unambiguous contractionary and expansionary effects, respectively. Our model suggests that depending on the propensity to save of wage-earners and profit-receivers, and the extent to which changes in the interest rate alters the distribution of wealth and income, the effect in the long period may be either contractionary or expansionary. Hence, the actual effect in different situations will depend on the specific behaviour of decision-makers and prevailing

institutions.

FOOTNOTES

1. In addition to the names given in the text, other contributors to the literature include Davidson (1972), Minsky (1982), and Weintraub (1958). These names are given for illustrative purposes only: for an exhaustive survey of post Keynesian ideas see Hamouda and Harcourt (1988).

2. See Rowthorn (1977), Marglin (1984a, 1984b), Taylor (1983, 1985), Dutt (1987a, 1989), and Amadeo and Camargo (1989).

3. For a discussion of the role of uncertainty see Shackle (1967), Carabelli (1988), Davidson (1988) and Lawson (1985, 1988).

4. See Robinson (1974, 1977) and Kaldor (1972, 1985).

5. This was essentially Keynes's procedure in the General Theory. For a detailed examination of Keynes's approach to the determination of the levels of output and employment, see Kregel (1976), Tarshis (1979), Chick (1983), Dutt (1987b), Amadeo (1987, 1989) and Asimakopulos (1988).

6. See especially Dutt (1987a, 1989).

7. See Kalecki (1971), Steindl (1952), Robinson (1962), Dutt (1984), Asimakopulos (1988). Some post Keynesian contributions have emphasized the interaction between the pricing and investment decisions, which we have discussed independently here, by assuming that firms raise their markups to attempt to generate ~~for~~ profits and hence financial resources, when they wish to invest at a higher rate. See Ball (1964), Wood (1975), Eichner (1976) and Harcourt and Kenyon (1976).

8. See Kaldor (1982), Moore (1979, 1988), Minsky (1982) and Rousseas (1986).

9. See, for example, Pasinetti (1983) and Fazi and Salvadori (1981, 1985).

10. Thus Keynes noted that "there is no unique long-period position of equilibrium equally valid regardless of the character of the monetary authority. On the contrary there are a number of such positions corresponding to different policies". (Keynes, 1982, p. 55).

11. See also Pasinetti (1988).

12. As noted above, this departs from Pasinetti's (1962) assumption that wage-earners and profit-receivers receive the same rate of return from their assets, and follows Laing (1969), Balestra and

Baranzini (1971) Pasinetti (1974a, 1983), Fazi and Salvadori (1981, 1985), in assuming that they hold different sets of assets. Unlike these contributions, however, we incorporate an explicit theory of interest and inflation rate determination into our analysis.

13. In particular we abstract from the influence of (expected) capital gains on equity, primarily to ignore issues relating to speculative bubbles.

14. The analysis so far follows Dutt (1987a, 1989).

15. The implications will be the same as those of models which introduce interest effects by allowing for the financing of working capital. See, for example, Taylor (1983).

16. If firms happen to save, as long as we assume that they always save a constant fraction of profits and allocate their wealth in the same way as do profit-receivers, we would not need to modify our analysis: the firms would in effect be saving on behalf of the latter. Modifications in our analysis would, however, be required if firms, because of their concern for their valuation ratios, or other needs of investment financing, choose their saving rate. For example, if an increase in the desired rate of accumulation led firms to increase their retention rates, this would, cateris paribus, dampen the expansionary effect of the higher desired accumulation. A similar effect, paradoxically, would occur if they increase their desired markup-rates when they desired rates of accumulation increase along the lines mentioned earlier: the result could be to reduce their profits. These results, however, do not ~~make~~ necessarily make these types of firm behaviour patterns irrational, because it is the joint behaviour of all the firms which reduces aggregate demand, as in the prisoners' dilemma problem.

17. See also Rowthorn (1981) and Dutt (1984) which assume that desired accumulation depends on both capacity utilization and the rate of profits. Here, for simplicity, we do not introduce the rate of profits as an additional variable.

18. There may also be a depressive effect of a higher inflation rate since this could cause greater uncertainty in the economy. We ignore this effect.

19. For the stability of short-period equilibrium, assuming that excess demand for goods leads to higher output, we assume $s_c-(s_c-s_w)va>\beta$. This condition, which states that the responsiveness of saving to changes in the rate of capacity utilization is greater than the responsiveness of investment to changes in the same rate, is standard in macroeconomic models of the type we are concerned with; otherwise quantity adjustment would take the economy either to full capacity or zero output in the short period.

20. For similar models of the evolution of the distribution of assets, but which do not introduce inflation or the post Keynesian analysis of money and interest, see Darity (1981) and Dutt (1988).

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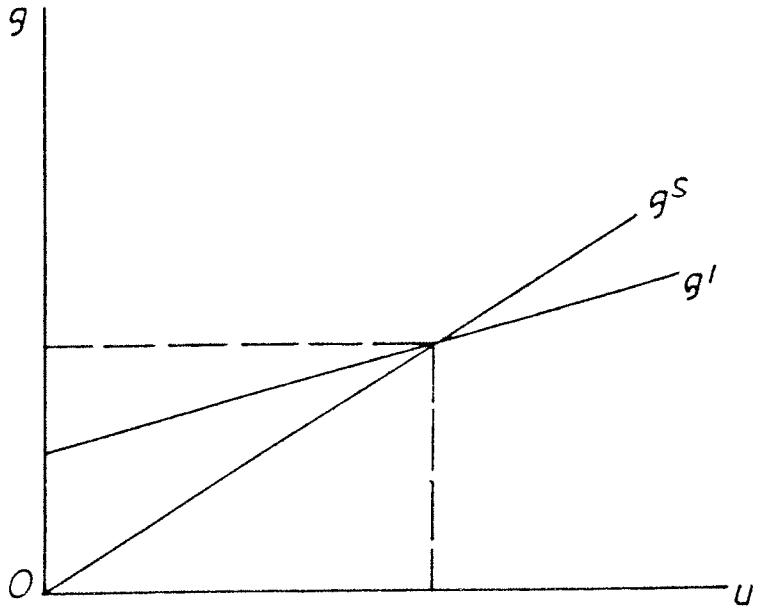


FIGURE 1.

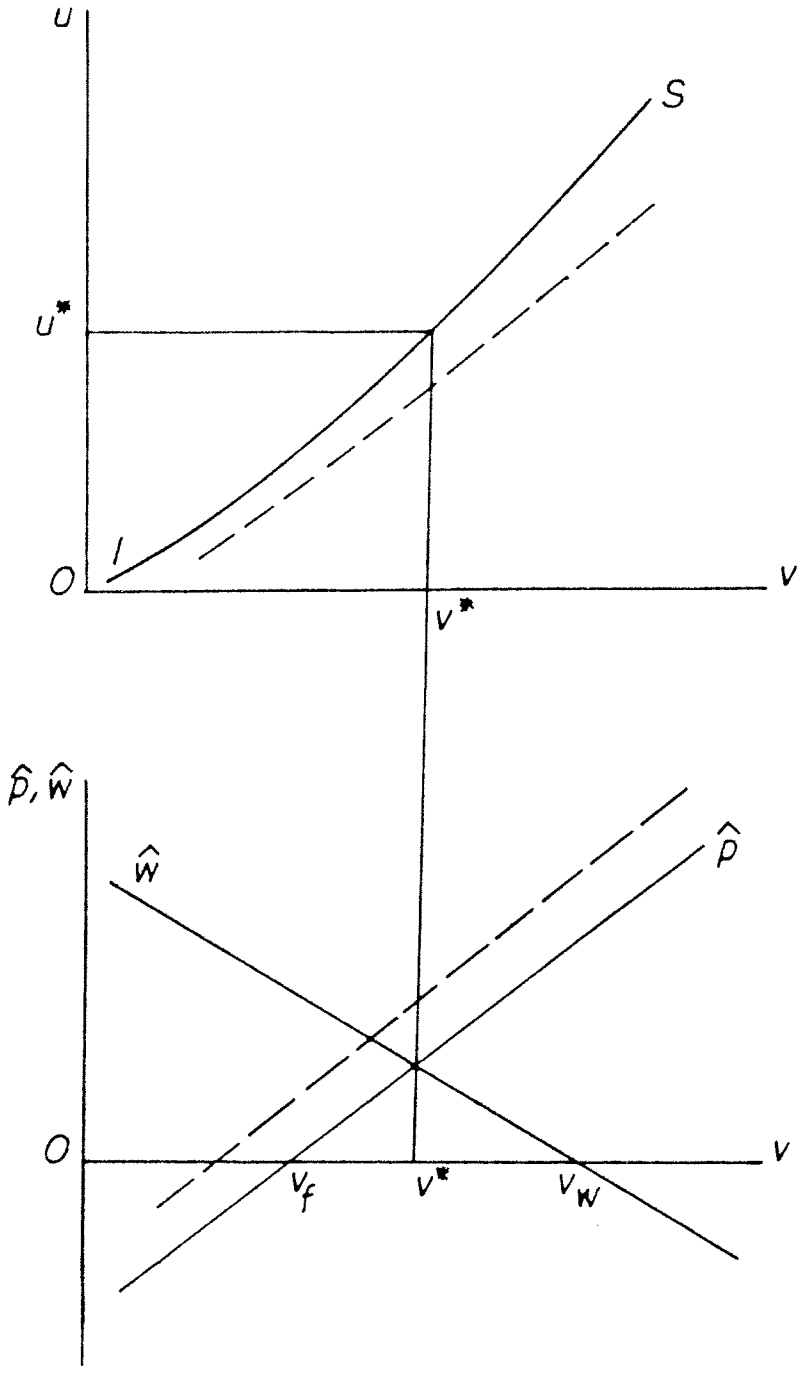
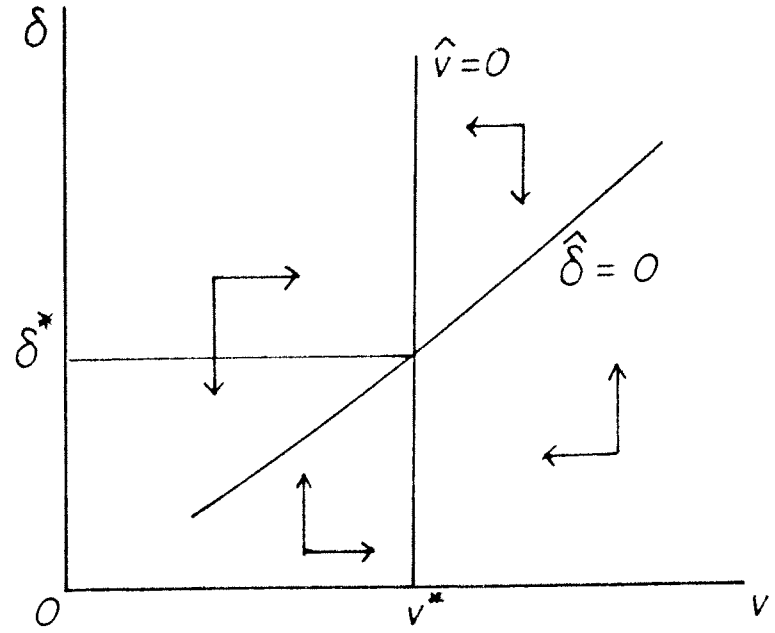
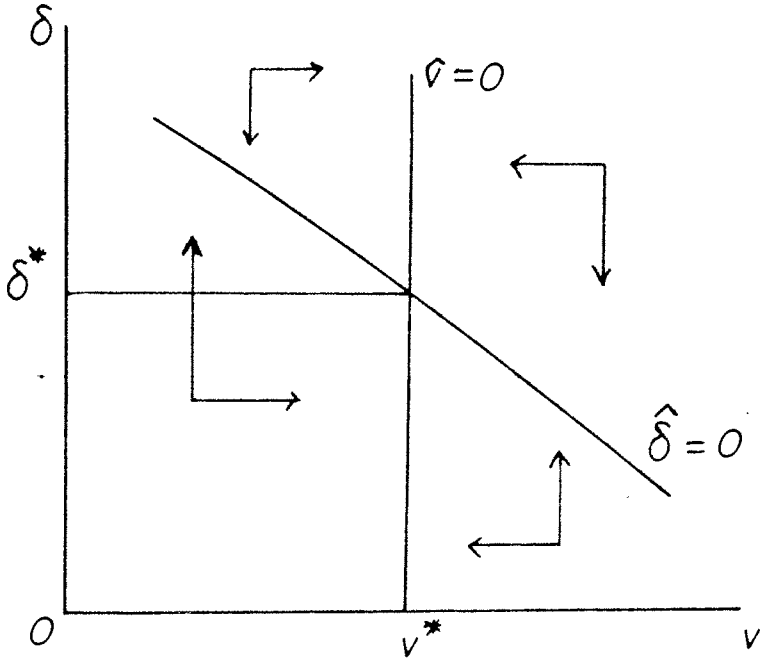


FIGURE 2

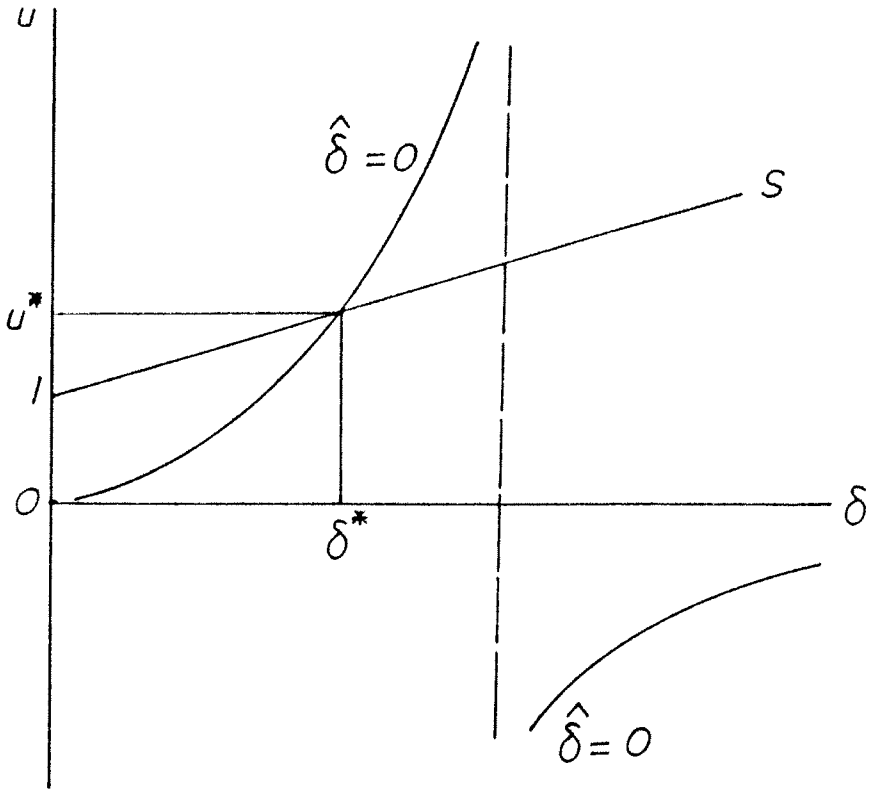


(a)



(b)

FIGURE 3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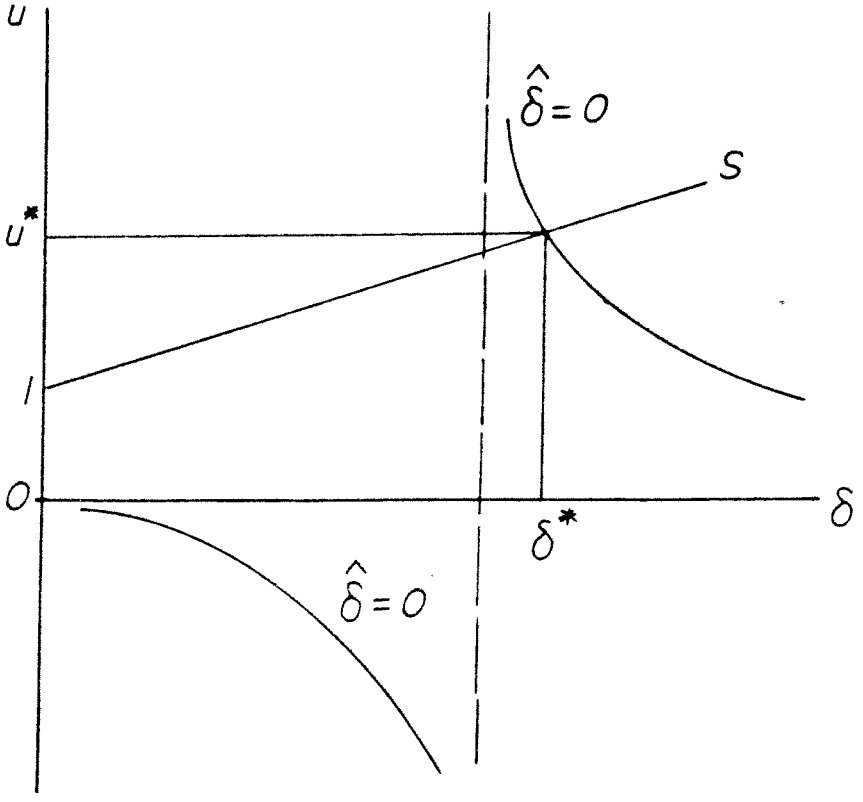
$\hat{\delta}=0$
S
u^*
1
0
δ^*
δ
$\hat{\delta}=0$

(a)


u
$\hat{\delta}=0$
S
u^*
1
0
δ^*
δ
$\hat{\delta}=0$

(b)

FIGURE 4

TEXTOS PARA DISCUSSÃO

230. Fritsch, W. e G.H.B. Franco, "Trade Policy, MNCs and the Evolving Pattern of Brazilian Trade, 1970-85".

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