6. Keynesian theories of growth

Pasquale Commendatore, Salvatore D'Acunto, Carlo Panico and Antonio Pinto

6.1. INTRODUCTION

This paper outlines the content of a Keynesian approach to the theory of growth. While for other established traditions it is possible to talk of a theory of growth described by some specified models and contributions,[1] for the Keynesian tradition it is only possible to identify several lines of development, which share the view that the economic system does not tend necessarily to full employment and that the different components of demand may affect the rate of growth of the economy.

As far as we know, there is no essay in the recent literature which seeks to reconstruct the content of a Keynesian approach to growth by describing the lines of research, which have historically emerged. In what follows an attempt will be made to do so. This attempt outlines a unified framework that can deal with the influence of the different components of aggregate demand on the rate of growth of an economic system that does not tend necessarily to full employment. The specification of this unified framework makes it possible to preserve the diversity of the ideas proposed by Keynesian authors on what can be considered the most relevant factors at work.[2] Moreover, it shows Keynesian growth theorists as a homogeneous crew, sharing a positive theoretical standpoint on the role of aggregate demand, rather than a group of authors united by a critical attitude towards orthodoxy, but unable to present a systematic challenge to the dominant theories.[3]

The paper is so organised. Section 6.2 aims to derive a unifying framework for Keynesian theories of growth from the analyses proposed by Harrod, the founder of modern growth theory. Sections 6.3, 6.4 and 6.5 deal with the analyses underlining the influence on growth of three components of effective demand, coming from the Government sector, the private sector, in the form of autonomous investment (i.e. investments not directly generated by savings), and the foreign sector. Section 6.6 draws some conclusions.

6.2. HARROD AND THE FORMATION OF A KEYNESIAN FRAMEWORK FOR GROWTH THEORY

According to Varri (1990, p. 9), Harrod's contributions to growth have received less attention than they deserve. Recently, however, Young (1989) and Besomi (1999) have reconsidered his writings, taking advantage of the availability of his papers at the Chiba University of Commerce in Ichikawa (Japan) and clarifying the extent to which some of his writings have been misrepresented. They have refuted, in particular, the view that Harrod's efforts to develop a theory of growth and dynamics were stimulated by his work on imperfect competition and his dissatisfaction with the Austrian trade cycle theory put forward by Hayek (see Kregel, 1980, p. 98; 1985, pp. 66–7). Moreover, they have confirmed the limits of the widespread belief that Harrod developed his analysis of growth by assuming absence of monetary influences and fixed technical coefficients and saving propensity, in order to establish the famous 'knife-edge problem' (Solow, 1956, 1970; for the opposite interpretation, see Eisner, 1958, Asimakopulos and Weldon, 1965, Kregel, 1980, Asimakopulos,1985).

In opposition to the first view, Young (1989, pp. 15–50) clarified that Harrod's efforts to develop a theory of growth and dynamics were mainly stimulated by his contacts with Keynes. These began in 1922, when Keynes invited Harrod to study economics in Cambridge under his supervision (Phelps Brown, 1980, pp. 7–8). One year later, having read *A Tract on Monetary Reform*,

> Harrod took up Keynes's call for deeper research into the problems of the 'credit cycle', and over the next few years produced a number of essays on the subject. In these Harrod focused on the theoretical basis for – and policy options related to – issues raised by Keynes in the *Tract*. (Young, 1989, p. 16)

According to Young, in these essays, some of which were never published, Harrod dealt with a problem that was central to Keynes's and other works of the time. Moving on from the idea that the economic system is stable and that negative influences on fluctuations only come from monetary and credit factors, attempts were made to identify a 'neutral' policy, i.e. a policy that can prevent monetary and credit disturbances from amplifying the fluctuations of the economy.

In those years Harrod also focused on Keynes's proposals for Government interventions.[4] According to Phelps Brown (1980, pp. 13 and 18), Harrod first heard Keynes's proposals at the Liberal Summer School of August 1924.[5] From then onwards, he closely followed Keynes's intellectual activity on this subject and after the Great Depression he actively supported

Keynes's proposals.[6] By that time, Harrod had come to recognise the need for deep political and theoretical changes. As Young (1989, pp. 30–8) points out in an unpublished paper written in 1933, Harrod stated that the Great Depression had posed a new problem to economists and politicians. The previous recessions had not led the economy too far from full employment, nor had they cast doubts on the belief that the economy is able to return to it. The severity of the Great Depression had changed this situation. It had jeopardised political stability and raised the problem both of a new political approach and of a new economic theory able to clarify whether market forces can lead the economy towards full employment or Government intervention is required to restore it.

As an initial contribution to these problems in 1933 Harrod published *International Economics*. This book, as Young (1989, pp. 38–9) points out, sets the lines of analysis that Harrod developed in the following years. In *International Economics* and in his 1936 *The Trade Cycle*, he moved from Keynes's *Treatise* (Young, 1989, pp. 48–50), to focus on the cyclical fluctuations of the economy around a line of steady growth. His aim was to point out that competitive market forces may widen the gap between actual and equilibrium growth, independently of the destabilising influences of monetary and credit factors, which had been underlined by the literature of the time. His 1939 essay on dynamics, again stimulated by the discussions with Keynes (*CW*, XIV, pp. 150–79), focused instead on the equilibrium paths of the economy and on the factors determining the 'warranted' and the 'natural' rates of growth. This study represented 'a preliminary attempt to give an outline of a "dynamic" theory' (Harrod [1939] 1972, p. 254) and 'a necessary propaedeutic to trade–cycle study' (p. 263).

It moved from the condition of equilibrium in the commodities' market. In the most simplified case, that of an economic system without Government intervention and closed to non-residents, this condition is represented by the equality between saving and investment decisions. In the formal presentation of his analysis, the saving propensity was taken as given. Yet Harrod ([1939] 1972, p. 276) made some reference to the influence of the interest rate on the propensity to save and, in his following writings, he recalled the possibility of using Ramsey's intertemporal approach on which to base this part of his analysis.[7] The equation relative to investment, which introduces, according to Sen (1970, pp. 11 and 23) and Asimakopulos and Weldon (1965, p. 67), the major difference with other traditions, assumes that investment decisions are taken independently of saving decisions and are not generated by them. They depend on the 'acceleration principle' and on the degree of utilisation of capital equipment, along the following lines:

$$i = k\, g^{*} + f(g - g^{*}_{-1}) \tag{6.1}$$

where $f(0) = 0$ and $df/dg > 0$, i is the ratio between investment and the net output of the economy, g^* is the current period expected rate of growth of output, g^*_{-1} is the previous period expected rate of growth, g *is* the current period rate of growth, k is the equilibrium capital/output ratio.

Harrod used his analysis to study the 'warranted' rate of growth (g_w), defined as that equilibrium rate which allows the normal utilisation of capital equipment.[8] He assumed that, along the warranted equilibrium path, expectations are realised ($g^*_{-1} = g$) and the expected rates of growth are equal to the warranted rate ($g^* = g^*_{-1} = g_w$). The following equations were thus used for the analysis of the warranted rate:

$$s = k\, g_w \tag{6.2}$$

$$k = k\,(r), \quad (k'(r) \leq 0) \tag{6.3}$$

$$r = r_0 \tag{6.4}$$

where s is the average propensity to save and r is the rate of interest. The introduction of equation (6.3) and (6.4) points out, in opposition to a widespread view, that Harrod did not develop his analysis of growth by assuming absence of monetary influences and fixed technical coefficients. Equation (6.4) assumes that the rate of interest depends on the conduct of monetary policy, which, according to Harrod, operates by stabilising this rate at some specified level.[9] Equation (6.3) recognises the possibility of substitution between factors of production. Harrod admitted the existence of decreasing marginal returns,[10] but considered that this kind of substitution was low, following the results reached by the Oxford Research Group, in which he actively participated. From equation (6.2) one can derive

$$g_w = \frac{s}{k} \tag{6.5}$$

The study of the 'warranted' rate was for Harrod a preliminary part of the analysis of the dynamic behaviour of the economy, which in 1939 was presented through the following steps.

The first step dealt with the forces that start to operate as soon as the economy gets out of equilibrium and expectations are not realised. According to Harrod ([1939] 1972, pp. 263–7), when the rate of growth differs from the equilibrium warranted rate, some centrifugal forces operate. If the former exceeds the latter, capital equipment is utilised above its normal level, inducing entrepreneurs to increase their investment decisions, as pointed out by equation (6.1). In the opposite case, capital equipment is utilised below its normal level, inducing entrepreneurs to reduce investment decisions. In both situations, the rate of growth will be pushed further away from the warranted level. This description was considered by Harrod ([1939]

1972, pp. 263–4) equivalent to that developed by static theory when it is assumed that the market price exceeds (is lower than) the equilibrium price and the appearance in that market of an excess supply (an excess demand) tends to restore equilibrium. These descriptions, unlike the 'cobweb' analysis in the traditional supply and demand theory, do not represent a dynamic analysis of disequilibrium. They just point out in an informal way that some centrifugal or centripetal forces come into operation as soon as disequilibrium occurs.

Most literature has interpreted this part of Harrod's work as the outcome of a dynamic analysis of stability. Sen (1970, p. 14), for instance, after pointing out that Harrod's analysis only deals with the initial elements of this problem and can be compatible with different analytical developments, criticised his conclusions.

> There are many other ways in which Harrod's somewhat incomplete model can be completed. Some confirm instability, while others either eliminate it or make it conditional on certain actual circumstances. In general, it will be fair to say that Harrod's instability analysis over-stresses a local problem near the equilibrium without carrying the story far enough, and extensions of his model with realistic assumptions about the other factors involved tend to soften the blow. (Sen, 1970, p. 14)

Already in 1939, however, Harrod had stated that his analysis did not give a complete account of the problem, suggesting some lines along which a dynamic analysis of the behaviour of the system can be developed.

> Space forbids an application of this method of analysis to the successive phases of the trade cycle. In the course of it the values expressed by the symbols on the right-hand side of the equation undergo considerable change. As the actual growth departs upwards or downwards from the warranted level, the warranted rate itself moves and may chase the actual rate in either direction. The maximum rates of advance or recession may be expected to occur at the moment when the chase is successful. (Harrod [1939] 1972, pp. 271–2)

Moreover, in the subsequent years, Harrod (1948, p. 99) first claimed that he was reluctant to enter the field of the dynamic analysis of disequilibrium without developing the analysis of the equilibrium warranted path which, according to him, had a higher degree of generality.[11] He then rejected the view that his aim had been to raise a 'knife-edge problem'[12] confirming that he had only tried to underline the existence of some centrifugal forces coming into play as soon as the economy gets out of equilibrium. The reference to these forces did not exclude the existence of other forces, producing stabilising effects, which have to be analysed by considering,

according to Harrod, that the 'natural' rate of growth represents the 'ceiling' limiting the expansion of the economy.

The second step of the analysis proposed by Harrod ([1939] 1972) to study the dynamic behaviour of the economy, considered the existence of forces pushing the 'warranted' rate of growth towards the 'natural' rate. This part of Harrod's work was based on his assumptions on substitution between factors of production and on the determination of the interest rate. As stated above, Harrod did not deny the existence of substitution between factors of production, but considered that it occurred to a small extent. After 1939, this idea was often restated: he claimed, with increasing emphasis, that he was sceptical on the possibility of reaching full employment through reduction of the interest rate.[13] Moreover, he confirmed that the rate of interest tends to show some rigidity, since it depends on the conduct of monetary policy, which, according to Harrod (1948, pp. 99–100; 1973, p. 67), operates by stabilising this rate at some specified level. This view of the interest rate, which also took into account the attempts of the monetary authorities to maintain the equilibrium of the balance of payments (Harrod, 1969, pp. 178 and 191; 1973, p. 75), raises the problem of the links between the theory of growth and that of distribution, since it was associated in Harrod's writings with the idea that a persistent change in this rate leads to a similar variation in the rate of profit.[14] The analysis of this problem, however, was little developed by the Oxford economist, who focused instead on the conclusion that one cannot rely on the belief that the spontaneous operation of market forces always leads the economic system towards full employment.

This conclusion led to the third step of analysis relative to the role of effective demand and Government policy on growth. Harrod ([1939] 1972) pointed out that the warranted rate could be influenced by three different components of effective demand coming from the Government sector, the private sector, in the form of autonomous investment, and the foreign sector. Harrod ([1939] 1972, pp. 269–74) gave some initial formal account of how these three sources of demand can affect the equilibrium path of the economy. Then, he focused on the Government sector and considered how policy can be used to stabilise the economy and to achieve higher growth and employment.

To sum up, the recent studies on Harrod's papers clarify that his seminal work on growth theory and dynamics was conceived as an extension of Keynes's analysis to a long-period context. It developed the view that the economic system does not tend necessarily to full employment and that the different components of aggregate demand may affect the rate of growth of the economy. His theory can be considered a prototype of a Keynesian approach to this problem: it outlines a framework that much literature within this tradition has subsequently adopted.

6.3. THE INFLUENCE OF THE GOVERNMENT COMPONENT OF AGGREGATE DEMAND

The need to take into account the influence of Government activity on growth was pointed out by Harrod ([1939] 1972, pp. 269–70 and 275), who also gave some initial formal account of how this source of demand can affect the equilibrium growth path of the economy. For him, Government policies have to be used both to stabilise the economy and to achieve higher growth.

> Policy in this field is usually appraised by reference to its power to combat tendencies to oscillations. Our demonstration of the inherent instability of the dynamic equilibrium confirms the importance of this. But ... in addition to dealing with the tendency to oscillation when it occurs, it may be desirable to have a long-range policy designed to influence the relation between the proper warranted rate of growth and the natural rate. (Harrod [1939] 1972, p. 275)

In 1939 Harrod claimed that both fiscal policy and variations in the long-term interest rate have to be used to pursue this long-range objective, adding that the latter are more appropriate than the former to this aim. The bank rate policy can be used instead to combat the runaway forces of the economy.

> If permanent public works activity and a low long-term rate availed to bring the proper warranted rate into line with the natural rate, variations in the short-term rate of interest might come into their own again as an ancillary method of dealing with oscillations. (Harrod [1939] 1972, p. 276)[15]

This position was maintained in Harrod (1948, pp. 74–5 and 117–22), where he again identified fiscal policy with 'public works'. In the subsequent writings these ideas were revised, claiming that it was advisable to rely on fiscal, rather than on monetary policy, to affect the equilibrium warranted path, so as to bring it close to the natural path, and to conduct fiscal policy by changing the tax rates while keeping Government expenditure constant.

This new position was presented in Harrod (1964 and 1973), where he also recalled that the conduct of policy is difficult owing to the complexity of the objectives to be achieved (Harrod, 1964, pp. 913–15) and to the fact that

> even if the authorities had succeeded in maintaining a steady growth rate ... for a substantial period of time – a state of affairs not yet realised – and there was general confidence that their success would continue, this would not relieve the entrepreneur of his major uncertainties ... Entrepreneurs usually have to cast their bread upon the water. (Harrod, 1964, p. 907)

He proposed to use the equilibrium condition of the commodity market to study how Government policy has to be applied and suggested dealing with this equation by taking the natural rate of growth as given, i.e. as the objective that the long-term policy has to pursue. Harrod (1973, p. 45) considered Government intervention necessary, arguing that this view was becoming increasingly popular.

> In the spectrum of countries ranging from individualism to socialism, the USA may be regarded as being at or near the individualist end. But even in that country 'monetary' and 'fiscal' policies are regarded as legitimate weapons of government, including the central bank. These policies serve to doctor the saving ratio and to provide enough, neither more nor less, to maintain reasonably full employment and growth in accordance with the growth potential of the economy. (Harrod, 1973, pp. 28–9; see also 1964, p. 906)

He also underlined that the traditional position, which confines the use of these policies only 'to ironing out the business cycle', 'implies too narrow a view of the duties of the authorities' (Harrod, 1973, p. 29).

Finally, Harrod (1964, p. 906; 1973, pp. 102–3, 173 and 177) claimed that fiscal policy was appropriate to achieve this long-term objective. It should be used by varying the tax rates while keeping government expenditure constant (Harrod, 1973, p. 107). Monetary policy was appropriate instead to deal with what he defined as the short-term policy objective of correcting the divergence of the actual rate from the warranted rate and stabilising the fluctuations of the economy. Temporary variations in the short-term rate of interest operate through their effects on the availability of credit in the markets (i.e. credit rationing) (Harrod, 1964, pp. 912–3; 1973, pp. 178–9). On the other hand, permanent variations in the interest rate tend to be more effective in causing similar variations in the rate of profit than in changing the capital/output ratio (Harrod, 1973, pp. 44, 78 and 111).

The formal analysis used by Harrod to deal with these views was limited. It can be developed as done in equation (6.6) below, which follows his proposal to study how to apply Government policy by using the equilibrium condition of the commodities' market, which in this case takes the form 'saving plus taxation is equal to investment plus Government expenditures'.

$$s\,(1 - t + r_b b) + t = kg + h + r_b b \tag{6.6}$$

where s is the private sector's propensity to save ($0 < s < 1$), t is the average tax rate, defined in terms of the net output of the economy ($0 < t < 1$), r_b is the interest rate on Government bonds, b is the amount of Government bonds in circulation, measured in terms of the net output of the economy ($b \geq 0$), k is the capital/output ratio ($k > 0$), g is the rate of growth of the economy, h is

the amount of Government expenditure on goods and services, measured in terms of the net output of the economy ($h \geq 0$).

As Harrod suggests, this equation can be used either to study the factors affecting the warranted rate of growth (in this case, g is taken as unknown, while r and the policy parameters t and h are taken as given) or to analyse how fiscal policy has to be applied to maintain reasonable full employment or growth in accordance with the potential of the economy (in this case, g is taken as given at its natural level, while one policy parameter, say t, is considered unknown). From equation (6.6) one can derive

$$g = \frac{s(1-t+r_b b)+t-h-r_b b}{k}. \tag{6.7}$$

It can be noticed that variations in the tax rate keep affecting growth even in the simplified case of a balanced Government budget and absence of Government bonds ($t = h > 0$ and $b = 0$), when equation (6.7) becomes

$$g = \frac{s(1-t)}{k}. \tag{6.8}$$

The influence of t on g does not depend on that of t on the propensity to save and on the capital/output ratio.[16]

The presence of Government debt and the interest rate in equation (6.7) raises the problem of the relationships between growth and distribution and between monetary and fiscal policy. Only the former problem is known to occupy a central place in the original development of the post Keynesian theory of growth and distribution.[17] Kaldor's 1958 Memorandum to the Radcliffe Committee, however, considers both problems simultaneously.

The Memorandum describes how Government policy can affect stability and growth. It argues that monetary policy has to stabilise the short-term interest rates in order to avoid some 'undesirable consequences'. The instability of the interest rates enhances financial speculation and reduces the ability of the markets to convey financial resources towards productive enterprises. Moreover, it raises the risk premium to be paid on loans of longer maturity and leads to higher long-term interest rates. Higher long-term interest rates, in turn, make the management of Government debt difficult. Moreover, they increase the probability that firms may not be able to pay back their loans, making lending institutions and financial markets more fragile. Finally, they tend to cause economic stagnation.

To justify the tendency to stagnation Kaldor made reference to his theory of growth and distribution and to the 'Cambridge equation'.

> In a steadily growing economy the average rate of profit on investment can, in the first approximation, be taken as being equal to the rate of growth in the money value of the gross national product divided by the proportion of profit saved … To keep the process of investment going, the rate of profit must exceed the (long-term) interest rates by some considerable margin. (Kaldor, [1958] 1964, pp. 137–8)

A monetary policy causing unstable interest rates raises the long-term rates to a level considered by investors too high to keep accumulation going. Under these circumstances, stagnation prevails, unless the rate of profit is raised too. According to Kaldor, this can be done through fiscal policy.

> If the rate of interest were higher than [the level that keeps investment going], the process of accumulation would be interrupted, and the economy would relapse into a slump. To get it out of the slump it would be necessary to stimulate the propensity to consume – by tax cuts, for example – which would raise the rate of profit and thus restore the incentive to invest. (Kaldor, [1958] 1964, p. 138)[18]

The post-Keynesian theory of growth and distribution, to which Kaldor greatly contributed, differs from Harrod's growth theory for the introduction of the saving propensities of different income groups and for the role attributed to distributive shares in restoring equilibrium conditions. According to some literature, this part of Kaldor's work departs from the Keynesian tradition, since it does not reject the idea that market economies tend to full employment.

Kaldor's Memorandum to the Radcliffe Commission does not confirm this allegation (Kaldor, [1958] 1964, pp. 135–7 and pp. 141–2). It shows many similarities with the views proposed by Harrod and the rest of Keynesian tradition on the role of Government policy. First of all, Kaldor considered Government policies necessary to pursue stability and growth. Secondly, he thought that Government policies have to deal with a complex set of objectives, which are interrelated – and often incompatible – among them. Thirdly, for Kaldor, monetary policy is the appropriate tool against the fluctuations of the economy, while it is advisable to use fiscal policy to pursue the long-range objective of sustained growth. Fourthly, when he advocated fiscal policy, Kaldor referred to variations in the tax rate, rather than to variations in the level of Government expenditure. Finally, like Harrod, Kaldor proposed to use the equilibrium condition of the commodities' market to deal with these problems and referred to it either to determine the growth path of the economy (considering the rate of growth as unknown and the interest rate, the tax rate and Government expenditure as given) or to determine the intensity of fiscal policy appropriate to the achievement of a specific rate of growth (considering one policy parameter – the tax rate – as unknown and the rate of growth as given).

Kaldor did not present his positions on the role of Government policy in a formalised way. Nor can such a treatment be found in other literature of that time. His reference to the Cambridge equation must then be considered, as he himself stated, a first approximation rather than the result of a thorough treatment of this problem. The first formal presentation of the post-Keynesian theory of growth and distribution, which explicitly introduced the Government sector, was provided by Steedman (1972). This article proved that in an analysis that assumes a balanced Government budget and no outstanding bonds, the Cambridge equation holds in a larger number of cases than the 'dual theorem' of Modigliani and Samuelson. Some years later, Fleck and Domenghino (1987), who challenged the validity of the Cambridge equation when the Government budget is not balanced, stimulated an intense debate on this subject. The debate has examined a large number of cases, showing when the Cambridge equation holds and confirming the conclusion that Steedman had previously reached.[19]

The debate showed how the views on the role of Government policy that Kaldor presented in the Memorandum to the Radcliffe Commission can be formally developed and clarified some features of his proposals. Let us consider the case examined by Denicolò and Matteuzzi (1990), in which the Cambridge equation holds. It refers to a closed economy with two classes (workers and capitalists),[20] where the Government sector finances its budget through the issue of bonds and the private sector finances its productive activity through the sale of shares to other components of the private sector. Capitalists do not work: they earn their income through the returns of their wealth. Moreover, the two classes have different saving propensities, can invest their wealth in shares representing real capital and in Government bonds, and have the same portfolio structure (for the case of different portfolio structures, see Panico, 1993). To study what are the conditions allowing steady growth, we must specify the equilibrium condition in the commodities' market, the dynamic equilibrium conditions between the savings of the two classes and the growth of their wealth, and the dynamic equilibrium condition between the Government budget and its debt. These conditions can be written as follows:

$$s_{c_c}(1-t)\,\alpha(r_b b + r_k k) + s_w(1-t)\,[1 + r_b b - \alpha(r_b b + r_k k)] + t =$$

$$= gk + h + r_b b \tag{6.9}$$

$$s_{c_c}(1-t)\,\alpha(r_b b + r_k k) = g\,\alpha(b + k) \tag{6.10}$$

$$g\,b = h + r_b b - t \tag{6.11}$$

where s_c is the propensity to save of the capitalist class ($0 < s_c < 1$), t is the tax rate ($0 < t < 1$), which is assumed to be the same on all forms of income, α is the quota of wealth owned by the capitalist class ($0 \leq \alpha \leq 1$), s_w is the propensity to save of the working class ($0 < s_w < s_c$), r_b is the rate of interest on bonds, b is the stock of Government bonds measured in terms of the net output of the economy ($b \geq 0$), g is the rate of growth, k is the capital/output ratio ($k > 0$), h is the Government expenditure on goods and services, measured in terms of net output ($h \geq 0$), r_k is the rate of return on real capital. If we assume $r_b = r_k = r$, equation (10) becomes:

$$s_c(1 - t)r = g. \tag{6.12}$$

This confirms the validity of the Cambridge equation, taking into account the role of t, and allows one to calculate the value of t compatible with steady growth at the rate of interest fixed by the monetary authorities.

Equations (6.9)–(6.12) thus show how to develop in a formal way the views proposed by Kaldor in his Memorandum to the Radcliffe Commission, where the lack of a formal analysis of how Government intervention can affect growth and distribution led the author to refer to a version of the Cambridge equation which, unlike equation (6.12), does not include the tax rate. As a consequence, Kaldor conceived the influence of tax variations on growth in terms of their effect on the propensities to save. The analysis presented above, instead, clarifies how Government intervention can affect demand and growth independently of changes in the propensities to save and in the capital/output ratio. It thus further elaborates Kaldor's attempt to describe how fiscal policy can be used to maintain steady growth conditions.

Finally, the results of the recent debate on the role of the Government sector in the post-Keynesian theory of growth and distribution clarify some other common elements of the classical and the Keynesian traditions (see Panico, 1997, 1999). They allow reconciliation of two approaches to distribution, which have been considered alternative (see Moss, 1978, p. 306; Vianello, 1986, p. 86; Nell, 1988; Pasinetti, 1988; Pivetti, 1988; Wray, 1988; Abraham-Frois, 1991, pp. 197 and 202). These are the approach proposed by Kaldor and Pasinetti in their theory of growth and distribution and that implied by Sraffa's (1960) suggestion in *Production of Commodities* to take the rate of profit, rather than the wage rate, as the independent variable in the classical theory of prices and distribution.

6.4. THE INFLUENCE OF AUTONOMOUS INVESTMENT

The introduction of an autonomous investment function is often considered to be what differentiates a Keynesian theory of growth from other

approaches. There is, however, no agreement in the literature on what characterises a Keynesian investment function and several investment-led growth theories have been proposed. The first type of theory (labelled neo-Keynesian) was proposed by Joan Robinson (1956, 1962) and Kaldor (1957 and 1961). They are characterised by full capacity utilisation of plants, flexible income shares and a functional relationship between the rate of capital accumulation and the rate of profits.[21] A second group of theories (labelled Kaleckian) was inspired by the works of Kalecki (1971) and Steindl (1952). They assume that firms under-utilise their productive capacity and apply mark-up procedures in determining prices. Moreover, capital accumulation is driven by profitability (through the rate of profits) and by effective demand (through the degree of capital utilisation). These investment-led growth theories have been further elaborated in the literature. In what follows, an attempt is made to compare the alternative lines of development of investment-led growth within the Keynesian tradition by introducing a homogeneous set of equations which can be modified to take account of the assumptions relating to capital utilisation, income distribution and investment determinants.

Let's assume (1) a closed economy with no government intervention; (2) two factors of production, labour and capital, with a fixed coefficient technology; (3) flexible labour supply; (4) absence of technological progress and capital depreciation; (5) identical physical composition of capital and product; (6) homogeneous firms. The following equations can then be written:

$$1 = wa_l + r_k k \tag{6.13}$$

$$\frac{1}{k} = \min\left(\frac{l}{a_l}, \frac{1}{a_k}\right) \tag{6.14}$$

$$u = \frac{a_k}{k} \tag{6.15}$$

$$\min(w_\pi, w_\omega) \leq w \leq \max(w_\pi, w_\omega) \tag{6.16}$$

$$s = s_c r_k k \tag{6.17}$$

$$\frac{i}{k} = \gamma(r_k, u, g) \tag{6.18}$$

$$s = i \tag{6.19}$$

where k is the capital/output ratio, w is the real wage rate, r_k is the rate of profits, l is the labour/capital ratio, a_l is the labour coefficient of production,

a_k is the capital coefficient of production, u is the degree of capacity utilisation, w_π is the wage firms are prepared to pay, w_ω is the wage workers are prepared to accept, s is the ratio between saving and output, i is the ratio between investment and output, g is the rate of growth of income, s_c is the capitalists' propensity to save, with $0 < s_c \leq 1$.

According to equation (6.13) output (normalised to one) is distributed between wage and profit recipients. Following expression (6.14), which describes a fixed-coefficient (Leontief) type technology, the elastic labour supply guarantees that the labour/output ratio always coincides with the corresponding technical coefficient, $a_l = lk$. Conversely, capital is not necessarily fully utilised. It follows that output is not necessarily the maximum technologically possible, $1/k \leq 1/a_k$. Expression (6.14) leaves open the determination of the degree of capacity utilisation, defined in expression (6.15) as the ratio between current demand and full capacity output. It is possible to envisage two cases. In the first, capacity is fully utilised, that is, the equality $u = 1$ ($1/k = 1/a_k$) holds. In the second, some capacity is left idle with the degree of capacity utilisation settling in any period at some level which does not necessarily equal one, that is, $u \leq 1$ ($1/k \leq 1/a_k$). Expression (6.16) also leaves the wage rate open to two possible determinations. In the first case, workers' and firms' claims over the shares of income (in real terms) are not inconsistent, $w_\omega \leq w \leq w_\pi$. If follows that distribution and growth are simultaneously determined. In the second case, workers and firms lay conflicting claims over income shares, $w_\pi \leq w \leq w_\omega$ (and $w_\omega \neq w_\pi$). The distribution between profits and wages depends on the relative power of workers and firms. The way in which distribution is in fact determined depends on the institutional setting. Equation (6.17) clarifies that saving propensities differ between classes. According to expression (6.18), investment demand depends on profitability (through r_k), on the demand level (through u) and on demand growth (through g). Keynesian approaches to investment-led growth differ inasmuch as they do not assign to each of the determinants of investment the same prominence. Finally, equation (6.19) represents the equilibrium condition saving equal to investment. The model (6.13)–(6.19) has three degrees of freedom. The way in which it is closed differentiates the Keynesian approaches to investment-led growth.

The neo-Keynesian position is represented by the following equations derived from expressions (6.13)–(6.19) by assuming full capacity utilisation, $u = 1(k = a_k)$; endogenous income distribution, $w_\omega \leq w \leq w_\pi$; and disregarding the role of the rate of growth of demand in the investment function:

$$1 = wa_l + r_k a_k \tag{6.20}$$

$$s = s_c r a_k \tag{6.21}$$

$$\frac{i}{k} = \gamma_0 + \gamma_1 r_k \tag{6.22}$$

$$s = i \tag{6.23}$$

By rearranging (6.20), one obtains the following expression

$$r_k = \frac{1}{a_k} - w\frac{a_l}{a_k} \tag{6.24}$$

which describes the traditional long-term negative relationship between r and w. Following Joan Robinson (1962), investors' 'animal spirits' (encapsulated in the constant coefficients γ_0 and γ_1) are prompted by expected profitability and favoured by the availability of internal finance. This explains the relationship (22) between desired investment and the rate of profits.

The model (20)–(23) is similar to that proposed by Marglin (1984a, 1984b) to describe the contributions of Joan Robinson and Kaldor to growth theory. By imposing the equilibrium growth condition according to which all the variables have to grow at the same rate, $i/k = g$, the solutions are univocally determined:[22]

$$\bar{r}_k = \frac{\gamma_0}{s_c - \gamma_1} \tag{6.25}$$

$$\bar{g} = s_c \frac{\gamma_0}{s_c - \gamma_1} \tag{6.26}$$

There are three major features of the neo-Keynesian analysis. The first is that distribution and growth are simultaneously determined. The second is the transposition to the long run of the so-called 'paradox of thrift', according to which an increase in the propensity to save induces a reduction in the rate of growth and in the equilibrium rate of profits. Indeed, by differentiating expressions (6.25) and (6.26) with respect to s_c one obtains

$$\frac{d\bar{r}_k}{ds_c} = -\frac{\gamma_0}{(s_c - \gamma_1)^2} < 0 \tag{6.27}$$

$$\frac{d\bar{g}}{ds_c} = -\frac{\gamma_0\gamma_1}{(s_c - \gamma_1)^2} < 0 \tag{6.28}$$

The third is the negative relationship between g and w. From (6.21), (6.23) and (6.24), taking into account the equilibrium condition $i/k = g$, it follows that

$$\frac{d\bar{g}}{d\bar{w}} = -\frac{s_c a_l}{a_k} < 0 \tag{6.29}$$

Lower levels of the wage rate correspond to higher accumulation. Profit leads growth.

If the equilibrium solution $\bar{w}$ lies outside the interval $w_\omega \leq w \leq w_\pi$, the neo-Keynesian analysis becomes overdetermined. When the left constraint is binding, $w = w_\omega > \bar{w}$ and $r_k < \bar{r}_k$, the economy suffers inflationary pressures, because investment demand permanently exceeds saving, $\bar{g}a_k > i > s$. Joan Robinson (1962) acknowledged this possibility by referring to an 'inflationary barrier' (also named 'real wage resistance'), which represents the minimum level of the real wage rate organised labour is prepared to accept without opposing rises in monetary wages.[23] Conversely, when the right constraint is binding, $w = w_\pi < \bar{w}$ and $r_k > \bar{r}_k$, the economy is stagnating since investment is too low (or saving is too high) for full capacity growth, $s > i > \bar{g}a_k$. This constraint may become operational when, following Kaldor (1957), firms are – regardless of demand – not prepared to lower prices below that level which guarantees a minimum profit margin π, which determines $w_\pi = (1/a_l) - \pi/a_l$ and depends on the Kaleckian 'degree of monopoly'. Note that the discrepancy between s and i can be reduced by varying s_c or (in the opposite direction) γ_0 and γ_1.

Unlike the neo-Keynesian approach, some economists (e.g. Rowthorn, 1981; Dutt, 1984, 1987, 1990; Nell, 1985; Amadeo, 1986a, 1986b, 1987 and Lavoie, 1992, 1995), inspired by the works of Kalecki and Steindl, developed analyses in which firms are allowed to operate under long-run under-utilisation of production plants. In Kaleckian analyses demand affects capital accumulation through changes in the degree of capacity utilisation. They assume, moreover, oligopolistic markets and conflicting claims over income distribution, $w_\omega > w_\pi$. This position can be represented by the following equations derived from expressions (6.13)–(6.19) by assuming an endogenous degree of capacity utilisation, $u \leq 1$; exogenous income distribution, $w = w_\pi$; and disregarding the role of the rate of growth of demand in the investment function:

$$1 = wa_l + r_k k \tag{6.30}$$

$$u = \frac{a_k}{k} \tag{6.31}$$

$$w = w_\pi \tag{6.32}$$

$$s = s_c r_k k \tag{6.33}$$

$$\frac{i}{k} = \gamma_0 + \gamma_1 r_k + \gamma_2 u \tag{6.34}$$

$$s = i \tag{6.35}$$

According to expression (6.32), income distribution is determined outside the model according to the Kaleckian theory of distribution. It is assumed that firms, independently of workers' wage resistance, fix prices through a mark-up procedure securing profit margin π, wage rate $w_\pi = (1/a_l) - \pi/a_l$ and profit share $r_k k = 1 - w_\pi a_l = \pi$.[24] Moreover, using (6.31), a relationship may be expressed between the rate of profits and the degree of capacity utilisation,

$$r_k = \frac{\pi u}{a_k} \tag{6.36}$$

according to which r_k is not univocally determined by income distribution as it was, according to expression (6.24), in the neo-Keynesian model. Equation (6.34), a linear form of (6.18), postulates a relationship between capital accumulation, the rate of profits and the degree of capital utilisation, specified by the constant coefficients γ_0, γ_1 and γ_2.[25] In Kaleckian writings the current rate of profits is relevant for investment decisions for two main reasons. It represents a proxy for expected profitability and also a source of internal financing.[26] The level of capacity utilisation affects investment decisions both indirectly (acting through the rate of profits) and directly by reflecting the state of demand.[27]

By imposing the equilibrium growth condition $i/k = g$, the solutions of equations (6.30)–(6.35) are univocally determined:

$$\bar{u} = \frac{\gamma_0 a_k}{(1 - w_\pi a_l)(s_c - \gamma_1) - \gamma_2 a_k} \tag{6.37}$$

$$\bar{r}_k = \frac{\gamma_0 (1 - w_\pi a_l)}{(1 - w_\pi a_l)(s_c - \gamma_1) - \gamma_2 a_k} \tag{6.38}$$

$$\bar{g} = \frac{s_c \gamma_0 (1 - w_\pi a_l)}{(1 - w_\pi a_l)(s_c - \gamma_1) - \gamma_2 a_k} \tag{6.39}$$

Note that the paradox of thrift is preserved, as shown by differentiating expressions (6.38) and (6.39) with respect to s_c,

$$\frac{d\overline{r}_k}{ds_c} = -\frac{\gamma_0(1-w_\pi)^2}{[(1-w_\pi a_l)(s_c-\gamma_1)-\gamma_2 a_k]^2} < 0 \tag{6.40}$$

$$\frac{d\overline{g}}{ds_c} = -\frac{\gamma_0(1-w_\pi a_l)[\gamma_1(1-w_\pi a_l)+\gamma_2 a_k]}{[(1-w_\pi a_l)(s_c-\gamma_1)-\gamma_2 a_k]^2} < 0 \tag{6.41}$$

The negative relationship between growth and the real wage rate, instead, disappears. Equations (6.30)–(6.35) generate the so-called 'paradox of costs', according to which an increase in costs, in the form of a higher wage rate, implies higher profits and growth rates (see Rowthorn, 1981, p. 18 and Lavoie, 1992, p. 307). By differentiating expressions (6.38) and (6.39) with respect to w_π, one obtains

$$\frac{d\overline{r}_k}{dw_\pi} = \frac{\gamma_0\gamma_2 a_k a_l}{[(1-w_\pi a_l)(s_c-\gamma_1)-\gamma_2 a_k]^2} > 0 \tag{6.42}$$

$$\frac{d\overline{g}}{dw_\pi} = \frac{s_c\gamma_0\gamma_2 a_k a_l}{[(1-w_\pi a_l)(s_c-\gamma_1)-\gamma_2 a_k]^2} > 0 \tag{6.43}$$

The paradox of costs is caused by the fact that investment expenditures are more sensitive to changes in effective demand (reflected by the degree of capacity utilisation) induced by changes in distribution (reflected by the wage share) than to changes in costs induced by changes in the wage rate (and in the profit margin).

The analytical condition indicating when the paradox of costs occurs is given by the value of the elasticity $\xi(u, \pi) < -1$. This elasticity measures the sensitivity of effective demand to changes in distribution. From (6.36), in fact, the inequalities $dr_k/d\pi < 0$ and $dg/d\pi < 0$ (and, therefore, $dr_k/dw_\pi > 0$ and $dg/dw_\pi > 0$) imply $\xi(u, \pi) < -1$. For the model (6.30)–(6.35), this condition always holds since, from (37),

$$\xi(\overline{u}, \pi) = -\frac{\pi(s_c-\gamma_1)}{\pi(s_c-\gamma_1)-\gamma_2 a_k} < -1$$

Note finally that, when the wage rate exceeds the value

$$w_\pi > 1-\frac{\gamma_2 a_k}{s_c-\gamma_1},$$

the equilibrium solution $\bar{u}$ does not satisfy the condition $u \leq 1$ and the Kaleckian analysis becomes overdetermined. When the constraint $u = 1$ is binding, firms cannot expand production to accommodate further rises in demand. The disequilibrium between demand and supply, $i > s > \bar{g}a_k/\bar{u}$, persists unless prices and profit margins rise and the wage share falls (see Rowthorn, 1981, p. 10). The neo-Keynesian adjustment mechanism is thus restored.

Moving on from the relationship between the rate of profits and the degree of capacity utilisation (36), $r_k = \pi u/a_k$, Bhaduri and Marglin (1990) amended the Kaleckian theory taking into account that investment reacts differently to similar changes in profitability. In particular, at the same rate of profit investment decisions differ when profit margins are low and capacity utilisation high and profit margins are high and capacity utilisation low. Firms may not be willing to expand further productive capacity when excess capacity is already extensive. Consequently, equation (6.34) has to be replaced by the following

$$\frac{i}{k} = \gamma_0 + \gamma_1 \pi + \gamma_2 u \tag{6.44}$$

The solutions of the model (6.30)–(6.33), (6.35) and (6.44), considering that $\pi = 1 - wa_l$, are

$$\bar{u} = \frac{[\gamma_0 + \gamma_1(1 - w_\pi a_l)]a_k}{s_c(1 - w_\pi a_l) - \gamma_2 a_k} \tag{6.45}$$

$$\bar{r}_k = \frac{(1 - w_\pi a_l)[\gamma_0 + \gamma_1(1 - w_\pi a_l)]}{s_c(1 - w_\pi a_l) - \gamma_2 a_k} \tag{6.46}$$

$$\bar{g} = \frac{s_c(1 - w_\pi a_l)[\gamma_0 + \gamma_1(1 - w_\pi a_l)]}{s_c(1 - w_\pi a_l) - \gamma_2 a_k} \tag{6.47}$$

By differentiating expressions (6.46) and (6.47) with respect to w_π, one obtains

$$\frac{d\bar{r}_k}{dw_\pi} = \frac{[\gamma_2 \bar{u} a_k - \gamma_1(1 - w_\pi a_l)a_l]a_l}{s_c(1 - w_\pi a_l) - \gamma_2 a_k} \tag{6.48}$$

$$\frac{d\bar{g}}{dw_\pi} = \frac{s_c[\gamma_2 \bar{u} a_k - \gamma_1(1 - w_\pi a_l)a_l]a_l}{s_c(1 - w_\pi a_l) - \gamma_2 a_k} \tag{6.49}$$

The sign of the derivatives (6.48) and (6.49) depends on the parameters of the model. It follows that the model modified with the investment function (6.44) is able to generate two alternative growth regimes. A wage-led growth regime, characterised by $d\bar{r}_k/dw_\pi > 0$ and $d\bar{g}/dw_\pi > 0$ ($d\bar{r}_k/d\pi < 0$ and $d\bar{g}/d\pi < 0$), prevails when $\bar{u} > \gamma_1 \pi a_l / \gamma_2 a_k$. The wage-led regime is characterised by great responsiveness of effective demand to changes in distribution, $\xi(\bar{u}, \pi) < -1$. The overall effect of an increase in the wage rate on growth is positive because the positive effect of demand (induced by the distribution in favour of workers) is greater than the negative effect of higher costs (generated by the increased wage rate or decreased profit margin). The paradox of costs holds. Conversely, a profit-led growth regime, characterised by $d\bar{r}_k/d\pi > 0$ and $d\bar{g}/d\pi > 0$ ($d\bar{r}_k/dw_\pi < 0$ and $d\bar{g}/dw_\pi < 0$), prevails when $\bar{u} < \gamma_1 \pi a_l / \gamma_2 a_k$. The profit-led regime is characterised by little responsiveness of effective demand to changes in distribution $\xi(\bar{u}, \pi) > -1$. Growth is enhanced by increases in the profit margin because the negative effect of changes in the wage share on demand is more than compensated by the inducement to invest caused by lower costs (lower wage rates). The negative relationship between w and r_k and g holds as in the neo-Keynesian model.

A recent attempt has been made to develop an approach (labelled neo-Ricardian) to investment-led growth in line with the Classical theory of prices and distribution (see Vianello, 1985, 1989, 1996; Ciccone, 1986, 1987; Committeri, 1986, 1987; Kurz, 1986, 1992; Garegnani, 1992; Serrano, 1995; Trezzini 1995, 1998; Garegnani and Palumbo, 1998; Ciampalini and Vianello, 2000; Park, 2000; and Barbosa-Filho, 2000). In this approach the 'normal' income distribution, that is, the distribution corresponding to the degree of capacity utilisation desired by entrepreneurs (which is also labelled 'normal'),[28] is determined by conventional or institutional factors.[29] Moreover, the rate of growth of demand may affect investment decisions, as a result of firms' constant attempts to match productive capacity to expected demand. This feature is not explicitly taken into account in neo-Keynesian and Kaleckian analyses. Neo-Ricardians also object that the Kaleckian approach has no adjustment mechanism between the current and normal degree of capacity utilisation.[30] However, they allow that these two magnitudes may differ for long periods of time.[31]

An attempt to clarify the neo-Ricardian position is made by introducing the following equations derived from expressions (6.13)–(6.19) by assuming an endogenous degree of capacity utilisation, $u \leq 1$; an exogenous income distribution, $w = w_\omega$; and disregarding the role of expected profitability in the investment function:[32]

$$1 = wa_l + r_k k \tag{6.50}$$

$$\frac{1}{k} = \min\left(\frac{l}{a_l}, \frac{1}{a_k}\right) \tag{6.51}$$

$$u = \frac{a_k}{k} \tag{6.52}$$

$$w = w_\omega \tag{6.53}$$

$$s = s_c r_k k \tag{6.54}$$

$$\frac{i}{k} = u - 1 + g\,u \tag{6.55}$$

$$s = i \tag{6.56}$$

Equation (6.53) assigns a conventional nature to the wage rate. Unlike the neo-Keynesian analysis, exemplified by equation (6.24), normal distribution, and in particular the normal rate of profits, is independent of accumulation. $r_n = 1/a_k - w_\omega(a_l/a_k)$ represents the normal rate of profits.[33] According to equation (6.55), investment expenditure is driven by an accelerator mechanism. The latter involves the entrepreneur's attempt to adjust productive capacity towards the planned degree (here corresponding to full capacity) and to install capacity to adjust to (expected) demand growth.

From (6.50)–(6.56), by imposing the equilibrium growth condition $u = 1$, one obtains the solutions:

$$\overline{r_k} = r_n \tag{6.57}$$

$$\overline{g} = s_c r_n \tag{6.58}$$

According to expressions (6.57) and (6.58), in equilibrium, the rate of profits coincides with its normal value and the rate of growth is governed by that level of saving, $s_c r_n$, which corresponds to normal capacity utilisation or 'capacity saving'. From this analysis it follows that, along the equilibrium path, effective demand does not affect growth.

To reassign a role to demand the neo-Ricardian literature has taken two routes. The first introduces in the equilibrium condition of the commodity market a component of demand that is independent of the level of income and its rate of change (Serrano, 1995; Park, 2000; and Barbosa-Filho, 2000).[34] The second abandons the use of equilibrium growth analysis and suggests the adoption of empirical and historical analyses, which are case-specific, in order to identify the influence of the various components of demand in different historical phases (see Garegnani, 1992; Ciampalini and

Vianello, 2000; and, for an example of historical analyses, Garegnani and Palumbo, 1988).

6.5. THE INFLUENCE OF THE EXTERNAL COMPONENT OF AGGREGATE DEMAND

The analysis of the influence of the external components of demand is mainly based on the contributions of Harrod, Kaldor and Thirlwall, which point out that the rate of growth of an open economy may be constrained by its trade performance. Some insights into the role of external demand can already be found however in Keynes's writings on the British return to gold. In *The Economic Consequences of Mr. Churchill* (*CW*, IX), Keynes claimed that the return to the pre-war parity would have had a negative influence on the British trade, making a sharp reduction of money wages necessary to restore the competitiveness of the national industry on overseas markets. The wage adjustment, however, would not have been painless: in the absence of a fall in the cost of living, workers' resistance to wage reductions had to be overcome 'by intensifying unemployment without limits' (*CW*, IX, pp. 211 and 218).

At the time, the theory of international trade was dominated by 'classical' thinking, according to which the balance of payments automatically adjusts through gold flows and consequent relative price movements: countries experiencing a trade deficit would lose gold, causing an internal price deflation which would induce a rise in exports and a fall in imports such as to restore equilibrium. According to Keynes, however, gold flows may fail to restore the balance of payments equilibrium if wages and prices react slowly to changes in the quantity of money: in these cases, the 'classical' mechanism would not work, and interest rate adjustments have to come into play to ensure capital inflows sufficient to compensate for the trade deficit, discouraging capital accumulation and slackening economic activity.

In the following years, Keynes restated this view on various occasions. In the evidence addressed to the Macmillan Committee, he went so far as to advocate protectionism as a remedy against recession, a provocative suggestion in a laissez-faire oriented environment (*CW*, XX, pp. 113–7). The proposal testifies to the relevance Keynes attributed to the constraint that the balance of payments can set to domestic prosperity. In his view, as long as monetary policy was sacrificed to the achievement of external equilibrium, Britain was inevitably condemned to stagnation (*CW*, XX, pp. 56–7). To 'release' monetary policy from this task the British competitive performance in overseas markets had to be improved. This view also emerges in the *General Theory*.

> In an economy subject to money contracts and customs more or less fixed over an appreciable period of time, where the quantity of domestic circulation and the domestic rate of interest are primarily determined by the balance of payments, …, there is no orthodox means open to the authorities for countering unemployment at home except by struggling for an export surplus and an import of the monetary metal at the expense of their neighbours. (*CW*, XIII, p. 348)

The idea that the trade performance of a country may affect its level of activity was restated by Harrod in his 1933 *International Economics*. Like Keynes, Harrod analysed the case of an economy with sticky wages, where the gold outflows caused by a trade deficit cannot affect relative prices, so that the 'classical' adjustment process does not work. In this case, the gold outflows would cause 'real' effects, and a poor trade performance may therefore become a constraint to domestic activity and employment (Harrod, 1933, pp. 118 and 125). This view is formally depicted through the so-called 'foreign trade multiplier' (pp. 119–23), that is a causal relationship going from exports to domestic output. Consider an economy with no Government sector and no saving and investment. In this case, income, Y, is spent either on home-made consumption goods, C, and imports, M:

$$Y = C + M \tag{6.59}$$

National income is equal to the sale of domestic goods at home, C, and exports, X:

$$Y = C + X \tag{6.60}$$

If the country spends on imported commodities a stable fraction μ of its income,

$$M = \mu Y \tag{6.61}$$

substituting (6.61) in (6.60) and equating (6.59) and (6.60), we get:

$$Y = \frac{1}{\mu} X \tag{6.62}$$

The link with Keynes' insights into the influence of international trade on domestic prosperity is straightforward: when deterioration of the trade performance of a country, whether a reduction of exports or an increase in the import propensity, occurs, the commodity market equilibrium is restored through a reduction of output. Thus, the country's trade performance may constrain economic activity and employment.

Harrod's analysis of the dynamic adjustment of output following an external shock also reflects Keynes' line of reasoning: in the case of a current account disequilibrium, the gold outflows would cause pressures on interest rates, thus affecting investment in fixed and working capital and giving rise to changes in domestic output (Harrod, 1933, pp. 135–7).

Harrod noted that, under the simplified assumptions of the model, the commodity market equilibrium automatically implies $X = M$ (Harrod, 1933, p. 120). He also clarified that the relationship between foreign trade performance and domestic ouput still holds in a more general model taking into account saving and investment, even if in this case the output adjustments may no longer be sufficient to assure balanced trade.

Other contributions to the study of the role of the external component of aggregate demand in growth theories can be found in the 1960s with Kaldor's work on growth rate differentials, where this analysis was intertwined with that of cumulative causation.[35] In these works, which had a great impact on development studies and on the subsequent birth of the 'evolutionary literature',[36] Kaldor claimed that orthodox theory fails to explain the divergence in growth rates among economies, which 'are largely accounted for by differences in the rates of growth of productivity' (Kaldor, 1966, p. 104). The latter, in turn, are mainly due to the economies of scale occurring within the industrial sector, whose rate of growth shows an 'extraordinarily close correlation' (Kaldor, 1978a, p. XVIII) with the rate of growth of GDP and productivity.

In order to describe the actual performance of the economies, Kaldor (1966; 1967; 1970; 1972) used the notion of 'circular and cumulative causation', introduced by Myrdal (1957), considering the dynamics of the industrial sector as the 'engine of growth'. Following Young, Kaldor (1966 and 1967) described growth as a process generated by the interaction between demand and supply: the rate of growth is positively related to the ability of supply to accommodate variations in demand and to the reaction of demand to changes in supply. Moreover, he clarified that economies move through different stages of economic development. In an early stage, the demand for consumption goods plays the leading role in the growth process. In the later stages, the leading forces are, respectively, the export of consumption goods, the demand for capital goods, and, finally, the export of capital goods (Kaldor, 1966, pp. 112–4).

In his subsequent essays, Kaldor underlined other aspects of the growth process. In 1970 he examined how growth depends on the rate of change of exports, by applying Hicks' (1950) 'super-multiplier' to an open economy and considering exports as the leading force, and consumption and investment as induced components. The rate of growth of exports, in turn, was assumed to depend on an external cause, the world rate of growth of

demand, and on a domestic cause, the rate of change of production costs. An increase in world demand raises exports and domestic production through the super-multiplier. Increasing returns in the export sector reduces costs, unless a proportional rise in wages occurs. The reduction in costs further increases exports, setting up a cumulative process, which tends to broaden the gaps with other regions.[37]

For Kaldor, therefore, the demand coming from the foreign sector plays a primary role in setting in motion the growth process, while the domestic sources of demand mainly influence the competitiveness of the economy and the intensity with which the external stimulus is transmitted to the rate of growth.

In 1975 Dixon and Thirlwall tried to embody in a formal model the view presented by Kaldor in his 1970 article. According to them, the working of the growth process in an open economy may be so depicted:

$$g = \gamma \hat{x} \tag{6.63}$$

$$\hat{x} = \eta_x \left(\hat{p} - \hat{p}_f - \hat{e} \right) + \varepsilon_x g_f \tag{6.64}$$

$$\hat{p} = \hat{w} - \hat{a}_l + \hat{\pi} \tag{6.65}$$

$$\hat{a}_l = a_0 + \lambda g \tag{6.66}$$

where g is the rate of growth of the economy, $\hat{x}$ the rate of growth of exports, $\hat{p}$, $\hat{p}_f$ and $\hat{e}$ are rates of change of domestic prices, foreign prices and exchange rates respectively, g_f is the rate of growth of world income, $\hat{w}$, $\hat{a}_l$ and $\hat{\pi}$ are rates of change of wages, labour productivity and mark-up factor respectively.

Equation (6.63) specifies Kaldor's idea that the rate of growth of the economy is directly related to the growth of exports.[38] Equation (6.64) is the dynamic formulation of a conventional multiplicative export function relating the rate of growth of exports to the rates of change of relative prices and world income, with η_x and ε_x being constant price and income elasticities. Equation (6.65) describes the rate of change of domestic prices as depending on changes in the unit labour costs and on changes in the mark-up factor. Finally, equation (6.66) describes the relation between the rate of change of productivity and the rate of growth of output known in the literature as the *Verdoorn's Law*.[39]

The equilibrium solution of equations (6.63)–(6.66) is

$$g = \frac{\gamma[\eta_x(\hat{w} - a_0 + \hat{\pi} - \hat{p}_f - \hat{e}) + \varepsilon_x g_f]}{1 + \gamma\eta_x\lambda} \tag{6.67}$$

Dixon and Thirlwall (1975) also presented the model in terms of finite difference equations, deriving equation (6.67) as the steady growth solution.[40] This equation can be used to describe the evolution of the rates of growth of different countries or of different regions within the same country. If one assumes a given mark-up in each region and given and equal values of $\hat{p}_f$, g_f, and $\hat{w}$ in all regions,[41] the differences in the rates of growth depend on the regional values of λ, γ, η_x, ε_x, and a_0.

Owing to its 'aggregate' structure, the model (6.63)–(6.66) neglects the role of the sectoral composition of the economy and, therefore, it does not adequately depict the richness of Kaldor's views on growth, based on the idea that the productive structure affects the overall rate of growth of productivity. Yet, the relevance of these 'composition effects' may be easily taken into account by analysing how the sectoral composition of the economy affects the parameters of the model.

As to λ, Kaldor (1971) argued that it mainly depends on the composition of demand and on the weight of the capital goods sector in the productive structure. High investments and a large capital goods sector enhance productivity and the competitive performance of the economy in the world markets.[42] According to Kaldor (1966; 1967; 1971), the influence of the composition of demand on productivity is due to the presence of variable returns in the different sectors of the economy. The intensity of the effect on productivity thus crucially depends on the sectors towards which the demand for consumption and investment is directed, since increasing returns mainly occur in the capital goods sector. Moreover, the extent to which this sector is able to accommodate demand is also important. High quotas of investment to output and of the capital goods sector in the productive structure enhance productivity changes, which, in turn, improve the international performance of the economy setting up and intensifying cumulative processes.

Kaldor (1971) referred to the role of composition of demand on long-term growth in his policy analyses too. He distinguished between the concepts of 'consumption-led' and 'export-led' growth, arguing that the latter is more desirable than the former: consumption-led growth tends to have negative long-run effects on productivity, since it tends to raise the weight of non-increasing return sectors in the productive structure of the economy. This tends to worsen the international performance of the economy. Hence, as stated in Section 6.3 above, Kaldor claimed that Government intervention should avoid the use of fiscal policy to increase the rate of growth and reduce unemployment. By making growth more dependent on the demand for consumption, this policy generates the undesired consequences previously

recalled. In this case, he said, the authorities should intervene on the exchange rate, rather than through fiscal measures.[43]

Kaldor's writings also hint at the factors affecting γ, which depends on the quotas and elasticities of the various components of domestic demand to the net output of the economy.[44] The elasticity of the demand for consumption is influenced by productivity growth through the introduction of new products of large consumption (Kaldor, 1966, p. 113; 1981, p. 603; and Rowthorn, 1975, p. 899). When this occurs a higher value of γ and a more intense effect of a given rate of growth of exports come about. For Kaldor (1971) tax reduction too has a positive influence on γ, through its effect on consumption.[45] Yet, any stimulus to the latter variable has long-run negative consequences, as stated above, since it makes the growth process consumption-led. Finally, the elasticity of imports depends on the degree of coincidence between the composition of demand and the productive structure of the economy. In 1966 Kaldor related the degree of coincidence of the productive structure to demand to the stage of development reached by a country. The more a country can rely on a large capital goods sector, the lower will be the elasticity of imports, the higher the value of γ and the more stimulating the effect of a given rate of change of exports. A country that has reached a stage of development which allows it to be a net exporter of capital good can enjoy 'explosive growth', since 'a fast rate of growth of external demand for the products of the "heavy industries" is combined with the self-generated growth of demand caused by their own expansion' (Kaldor, 1966, p. 114).

An important and controversial issue concerns the factors affecting η_x and ε_x. Kaldor (1971) considered price competitiveness the most important factor at work. In Kaldor (1978c) this position was abandoned, on account of the fact that the worst performing countries in terms of relative prices after the Second World War proved to be the best performing in terms of exports (McCombie and Thirlwall, 1994, pp. 262–300). Kaldor (1981) then concluded that the rate of growth of exports mainly depends on income elasticity, which in turn depends on the innovative capacity of a country, that is, the capacity of a country to differentiate its products. This innovative capacity gives the economy a privileged position in foreign markets.

In their 1975 paper, Dixon and Thirlwall also tested their model on United Kingdom data, but the model gave rise to unsatisfactory approximation between fitted and actual values over the period 1951–66, since higher than actual growth rates were systematically predicted. According to Thirlwall (1998, p. 194) this discrepancy could be explained by the neglect of the balance-of-payments constraint, in that period a severe hurdle to Britain's growth performance. To make up for this failure, in 1979 Thirlwall worked out an analytical model incorporating the external equilibrium condition,

described by the following equation:

$$p\,X + F = p_f\,M\,e \tag{6.68}$$

where p is the export price index, p_f the import price index, e the exchange rate and F the value of net capital flows measured in domestic currency. Expressing (6.68) in terms of rates of change, we get:

$$\theta(\hat{p}+\hat{x})+(1-\theta)\,\hat{f} = \hat{p}_f + \hat{m} + \hat{e} \tag{6.69}$$

where $\hat{m}$ and $\hat{f}$ denote respectively the rate of growth of imports and the rate of change of net capital flows, while θ and $(1 - \theta)$ are respectively the value of exports and capital inflows as a percentage of imports. If we specify the demand for imports and exports through the conventional multiplicative functions with constant elasticities, we may express the rate of change of exports through equation (6.64) and the rate of change of imports by:

$$\hat{m} = \eta_m(\hat{p} - \hat{p}_f - \hat{e}) + \varepsilon_m g \tag{6.70}$$

where η_m and ε_m are price and income elasticities respectively. Substituting (6.64) and (6.70) in (6.69) and rearranging, we get:

$$g_B = \frac{\theta\varepsilon_x g_f + (1-\theta)(\hat{f} - \hat{p}) + (1+\theta\eta_x + \eta_m)(\hat{p} - \hat{e} - \hat{p}_f)}{\varepsilon_m} \tag{6.71}$$

where g_B is the rate of growth consistent with equilibrium in the balance of payments. Basing his work on the extensive empirical evidence showing long-run stability in the terms of trade,[46] Thirlwall assumed that the contribution to growth of the price term in (6.71) is likely to be small. If for simplicity's sake it is assumed to be zero, equation (6.71) reduces to:

$$g_B = \frac{\theta\varepsilon_x g_f + (1-\theta)(\hat{f} - \hat{p})}{\varepsilon_m} \tag{6.72}$$

If we also assume that a country cannot finance its trade deficit through capital inflows for a considerable length of time, the long-run equilibrium requires that $\theta = 1$ (McCombie, 1998, pp. 229–32). Equation (6.72) changes into

$$g_B = \frac{\varepsilon_x}{\varepsilon_m} g_f \tag{6.73}$$

which represents the dynamic version of Harrod's foreign trade multiplier. The economic meaning of equation (6.73) is that a poor trade performance constrains a country to grow at a slower pace than that allowed by the growth of internal demand and by resource availability. If $g > g_l$, imports would grow quicker than exports, worsening the country's trade account and forcing policy-makers to intervene. When for various reasons (real wage-resistance and subsequent transmission of exchange rate variations on domestic prices, product differentiation leading to small price elasticity of demand for tradable goods, etc.) exchange rate devaluations prove ineffective, the balance of payments adjustment takes place through internal demand deflation, which slackens the pace of growth (Thirlwall, 1979, pp. 279–80). Analogously, if $g < g_l$ and the country is able to expand internal demand, the pressure of demand upon productive capacity may raise the capacity growth rate up to the ceiling represented by equation (6.73). According to this approach, capital and labour availability does not constrain growth, being to a large extent 'endogenous' to the economic system.[47]

The relevance of equation (6.73) lies in the fact that it supplies a simple and attractive explanation of why growth rates differ among countries. An increase in world income generates a rate of growth that depends on the value of each country's $\varepsilon_x/\varepsilon_m$ ratio. Since there are significant international differences in this ratio (Houthakker and Magee, 1969), the same increase in the world income gives rise to different growth rates among countries.

A relevant question, to which this strand of literature has not yet given a conclusive answer, is what determines the $\varepsilon_x/\varepsilon_m$ ratio. In some contributions, Thirlwall (1979, p. 286 and 1991, p. 26) claims that the differences in this ratio mainly reflect those in the patterns of productive specialization. This way of interpreting the dynamic foreign trade multiplier has striking implications for the theory of uneven development. For example, assume a simplified world where some countries only produce manufactured goods and others only produce primary goods. As the income elasticity of the demand for manufactured goods, due to Engels' Law, is higher than income elasticity of the demand for primary goods, it would be $\varepsilon_x/\varepsilon_m > 1$ for countries producing manufactured goods and $\varepsilon_x/\varepsilon_m < 1$ for those producing primary goods. According to this view, therefore, the pattern of specialisation is the source of a process of cumulative divergence in GDP levels: countries producing primary goods would be unable to grow at the same rate as those producing manufactured goods, owing to their tighter balance-of-payments constraint.

Although attractive, this way of interpreting the foreign trade multipliers has been poorly supported on empirical grounds,[48] inducing Thirlwall to return to the topic and clarify that, for industrial countries, income elasticities must also be made to depend on the supply characteristics of the goods

produced, such as their technical sophistication and quality (see Thirlwall, 1991, p. 28 and 1998, p. 187). With this revision, the 'cumulative divergence' view rooted in the post-Keynesian tradition may be extended even to growth differentials among industrial countries: in Thirlwall's view, indeed, an initial discrepancy in growth rates sets in motion the negative feedback mechanisms associated with Verdoorn's Law, which 'will tend to perpetuate initial differences in income elasticities associated with "inferior" productive structures on the one hand and "superior" industrial structures on the other' (Thirlwall, 1991, p. 27).[49]

Thirlwall's 1979 analysis has been subsequently extended to take into account the role of international capital flows. Thirlwall and Hussain (1982) used equation (6.72), instead of (6.73), to capture the experience of some developing countries running persistent current account deficits, financed by foreign investment. In some more recent contributions (Moreno Brid, 1998–99, McCombie and Thirlwall, 1999), however, the use of equation (6.72) has been considered inappropriate for a steady-state analysis without imposing any restriction on the evolution path of foreign capital inflows, as the lack of this restriction may generate a path of foreign debt unsustainable in the long run. According to Moreno Brid (1998–99), international credit institutions impose on developing countries borrowing restrictions based on some index of their expected ability to repay the foreign loans. He therefore proposes a different specification for the balance-of-payments constraint based on the requirement of a constant ratio between the current account deficit and the GDP, interpreted as a measure of a country's creditworthiness. When this restriction is added to the model, the dynamic foreign trade multiplier may assume a value higher or lower than the standard one, depending on the initial current account position of the country concerned. This revision has considerable implications for empirical analysis, clarifying that estimates of the $\varepsilon_x/\varepsilon_m$ ratio may be significantly biased if they do not take into account the countries' initial export/import ratio.

To sum up, the balance-of-payments constraint approach provides some important insights into the analysis of the relationship between external demand and growth. While on theoretical grounds the relevance of the cumulative causation mechanism embodied in the model (6.63)–(6.66) cannot be denied, the empirical evidence seems to show that the simpler formula described by equation (6.73) suffices to capture the main 'stylised facts' relating to growth.[50] As the analysis of the factors affecting the $\varepsilon_x/\varepsilon_m$ ratio seems to suggest, however, the balance-of-payments constraint approach does not obscure the peculiar role played by the interaction between 'external' and 'internal' factors underlined by Kaldor in his writings.

6.6. CONCLUSIONS

Harrod's seminal work on growth theory was conceived as an attempt to extend Keynes's analysis. It moved from the Keynesian ideas that the economic system does not tend necessarily to full employment and that aggregate demand may affect the rate of growth of the economy. In subsequent years, Keynesian economists developed this approach along several lines, focusing on the different components of aggregate demand and on their role in the growth process, by using several descriptive and analytical methods. As stated above, this multiplicity of ideas and analyses shows, according to some authors, the fertility of this line of thought. Conversely, an external observer may judge the lack of a unified framework a weakness, considering the Keynesian literature a disorderly set. By reconstructing the content of a Keynesian approach to growth and describing the lines of development that have historically emerged, this chapter has tried to underline the wealth of this tradition. At the same time, it has sought to outline the existence of some unifying elements which, while preserving the diversity of ideas and analyses, reduces the risk of interpreting the Keynesian literature as a disorganised set.

NOTES

1. The model proposed by Solow (1956) describes the neoclassical theory of growth. For the classical tradition one can refer to the analyses proposed by Pasinetti (1960a) and by Samuelson (1978). The analyses presented by Barro and Sala-i-Martin (1995) give the main elements of the New Growth Theories.
2. This multiplicity of ideas and analyses is, according to some authors (e.g. Dow, 1985; Hamouda and Harcourt, 1989; and Chick, 1995), a great merit of the Keynesian literature, since it adds to the richness of this line of thought.
3. See Rochon (1999, pp. 64–9) for a collection of these criticisms against Keynesian economics, raised by authors like Solow, Backhouse, Dornbusch, Fisher, Felderer and Homburg.
4. 'During the twenties many of us were deeply interested in Keynes's advocacy of measures to promote fuller employment' (Harrod, 1967, p. 316).
5. Harrod (1951b, ch. IX, par. 3) recalls however Keynes's article in the *Nation*, May 24, where the Cambridge economist presented for the first time his proposals for public works.
6. Phelps Brown (1980, p. 19) points out that after 1932, Harrod wrote several letters to *The Times*, in favour of Keynes's proposals.
7. See Harrod (1948, p. 40; 1964, pp. 903 and 905–6). The similarity between Harrod's and Ramsey's analysis of saving is underlined by Asimakopulos and Weldon (1965, pp. 66). Harrod (1973, p. 20) also clarifies that 'what each person chooses in regard to saving is governed by various institutional arrangements, which differ from country to country and from time to time. There is the question of what the State will provide for future contingencies – old age, ill health, unemployment, etc. – by current transfer payments as and

when they arise. The more ground that the State covers, the less will the individual feel it incumbent to provide for himself by saving. Personal saving will also be affected by the degree the education of one's children is subvented by the public authorities'.

8. According to Harrod ([1939] 1972, p. 264), the warranted rate is the rate that, if it occurs, leaves producers satisfied, in the sense that for them 'stock in hand and equipment available will be exactly at the level they would wish to have them'.
9. Harrod (1948, p. 83) points out that his analysis of the warranted rate assumes the rate of interest constant. He referred to the realism of Keynes's view on the behaviour of the interest rate (pp. 64–5), agreeing that this rate may be rigid (pp. 56–7) and unable to decrease in such a way as to lead to full employment (pp. 70–1; 83–4; 97; 99).
10. See Harrod ([1939] 1972, pp. 258, 259 and 276). On page 276, in particular, Harrod explicitly referred to an inverse relationship between *k* and *r*. In the 1930s the neoclassical assumption of decreasing marginal returns was generally accepted. Sraffa's critique of the neoclassical theory of capital had not yet been elaborated. (See Panico, 2001, pp. 300 and 308–9 fn. 59, 60 and 61). As is well known, it was published in 1960 and discussed at length in the following decade.
11. Dealing with his analysis of the equilibrium warranted path, Harrod claimed: 'I know of no alternative formulation, in the world of modern economic theory, of any dynamic principle of comparable generality. We must start with some generality however imperfect. We shall never go ahead if we remain in a world of trivialities or fine points. It is useless to refine and refine when there are no basic ideas present at all' (Harrod, 1948, pp. 80–1).
12. As to the 'knife-edge problem' Harrod stated: 'Nothing that I have ever written (or said) justifies this description of my view' (Harrod, 1973, p. 31; but see also pp. 31–45).
13. See Harrod (1948, pp. 132–3, 137–8 and 144; 1960, pp. 278–9, 283 and 285; 1964, pp. 910–13; 1973, pp. 68, 78, 80, 102). It should be noted too that, after 1960, Harrod thought that the major influence of the interest rate on investment is through the availability of finance, owing to the fact that the credit markets are imperfect (information are asymmetrically distributed) and tend to react to the shortage or availability of credit (see Harrod, 1960, pp. 278–9 and 292; 1964, pp. 912–13; 1973, pp. 44, 61, 179).
14. 'sustained low interest will presumably in the long run reduce the normal profit rate' (Harrod, 1973, p. 111). And again: 'If the market rate of interest rises considerably and stays up for a substantial period, ... that may cause firms to increase the mark-up' (p. 44; see also, p. 78).
15. Harrod (1964, p. 908) gave a somewhat different account of this point: 'In the concluding pages of my first "Essay" I did recognise that there were two distinct problems of policy, namely: (*i*) the short-term one of preventing deviations from a steady growth rate, and (*ii*) the long-term one of bringing the warranted rate into line with the natural growth rate. I recognised that, if the warranted rate was not equal to the natural rate – and there is no reason why it should be – difficulties would inevitably arise. Thus, policy was required to bring them together. My remarks on this subject were admittedly very sketchy. I suggested that the long-term interest rate might be used to make the warranted rate adhere more closely to the natural rate, while "public works" (nowadays "fiscal policy") and the short-term rate of interest should be used to deal with short-term deviations. All this was very loose. The existence of the double problem was, however, recognised'.
16. Some recent contributions to the New Growth Theories consider, instead, the influence of Government intervention on growth, be it a change in taxation or in expenditure, through its effect on the propensity to save and on the capital/output ratio (see Barro, 1990).
17. In his seminal contribution Kaldor (1955–56, p. 98) explicitly recognised the need to deal with the State in the analysis of steady growth conditions. Yet, like other authors, he failed to do so in most of his later work.

18. According to Kaldor ([1958] 1964, pp. 136–7), the drawback of this solution is that in times of inadequate demand the Government gradually transforms the economy into one of high consumption and low investment, with the undesirable consequences on long-run growth, which will be described in Section 6.5 below.
19. In this debate, Pasinetti (1989a; 1989b) and Dalziel (1989; 1991b; 1991–92) examine the validity of the Cambridge equation by introducing into the analysis the Ricardian debt/taxation equivalence. Denicolò and Matteuzzi (1990) and Panico (1993, 1997, 1999) consider the same topic by introducing into the analysis the existence of financial assets issued by the Government. Commendatore (1994, 1999a), instead, compares the limits of validity of the dual and the Pasinetti theorem.
20. Denicolò and Matteuzzi (1990) deal with the so-called 'personal' version of the post-Keynesian theory of growth and distribution. It may be noted, however, that the debate has considered different versions of the post-Keynesian theory of growth and distribution: the personal version, in terms of classes, the functional version, in terms of income groups, and the institutional version, in terms of sectors of the economy (see Panico, 1997 and Commendatore, 1999a, 1999b).
21. Kaldor (1955–56) and Pasinetti (1962), instead, assume that investment is exogenous. Their models are characterised by full employment. According to some authors this assumption cannot be considered Keynesian (see Marglin, 1984a, p. 533–4 and Kurz, 1991, p. 422). In Section 6.3 above, however, we have pointed out that for Kaldor, full employment growth can be achieved through suitable policy interventions. In the absence of government interventions, the economy does not necessarily grow at the full employment rate. Pasinetti, on the other hand, explicitly investigates the conditions of steady growth at full employment. For a survey of the subsequent developments of the neo-Keynesian theory, see Baranzini (1991) and Panico and Salvadori (1993).
22. The introduction of a non-linear form for expression (6.22) could generate multiple solutions, some of them unstable. This is the case of Joan Robinson's (1962) well-known 'banana diagram' which gives rise to two equilibria, one stable and one unstable.
23. Marglin (1984a, 1984b) solved this type of overdetermination by introducing in the analysis a new variable, the rate of inflation, depending on the discrepancy between s and i. According to this author, 'equilibrium can be characterised in terms of investment, saving, and conventional wages, but to do so we must abandon the static characterisation of equilibrium in favour of a dynamic one. Using the disequilibrium dynamics of the two systems, we can synthesise Marxian and Keynesian insights into a just-determined model in which investment, saving, and the conventional wage jointly determine equilibrium' (Marglin, 1984b, pp. 129–30).
24. Dutt (1987; 1990) presented a more refined resolution mechanism of conflicting claims between firms and workers which could generate a value of the wage rate between w_π and w_ω.
25. In the Kaleckian literature these coefficients are not univocally interpreted. According to Dutt (1984, p. 28), γ_0 and γ_1 accounts for the (constant) entrepreneurs' desired degree of capacity utilisation. Lavoie (1992, 1995), instead, interpreted γ_0 as firms' expected rate of growth of sales, which is not necessarily constant.
26. These are the same reasons invoked by Joan Robinson (1962). See above.
27. According to Steindl (1952), firms plan a reserve of excess capacity facing uncertainty. This is to avoid the permanent loss of market share owing to the temporary inability to fulfil unexpected demand. Other reasons, invoked by the literature to justify firms' planned excess capacity, are: (1) seasonal fluctuations of demand; (2) expected growth in demand; (3) costly use of overtime work and night shifts or shifts involving out-of-the-ordinary hours or

days; (4) indivisibility of plants and equipment. For a short review on this argument, see Lavoie (1992, pp. 124–6).

28. The normal degree of capacity utilisation, u_n, is 'the degree of utilisation of capacity desired by entrepreneurs, and on which, therefore, they base their investment decisions about the size of a new plant relative to the output they expect to produce' (Garegnani, 1992, p. 55).
29. In particular, income distribution can be determined either by referring to some 'conventional standard of life', which affects the wage rate, or, alternatively, by the level of the money interest rates, which affects the rate of profits, as suggested by Sraffa (1960, p. 33) and envisaged by Vianello (1996).
30. On the absence of an adjusting mechanism between u and u_n, Committeri warned that if 'the "equilibrium" utilisation degree does not coincide with its normal level, and hence producers' expectations are not being confirmed by experience … as the economy moves away from the steady path, the model has nothing to say about the long-run tendencies of capital accumulation' (Committeri, 1986, p. 175). See also Ciampalini and Vianello (2000).
31. According to Garegnani (1992, p. 59), 'the entrepreneurs will certainly attempt to bring about, through investment, a capacity which can be used at the desired level. And the degree of their success will depend on how well they will be able to forecast the outputs which it will be convenient for them to produce. But given the initial arbitrary level of capacity that success will show only in shifting, so to speak, backward in time the deviation of the utilization of capacity from the desired level. Even correct foresight of future output will not eliminate average utilization of capacity at levels other than the desired one'.
32. Neo-Ricardians consider the normal rate of profits, r_n, a more suitable variable than the current rate of profits, r, to capture the role of expected profitability in investment decisions. See on this point Vianello (1996, p. 114).
33. We assume, for simplicity, that normal and full capacity utilisation coincide, $u_n = 1$. From equations (6.50) and (6.51) r_n follows.
34. The independent component of aggregate demand can come from any sector of the economy. Notice that this analysis only shows that effective demand can affect the adjustment path towards equilibrium even if along this path $u = 1$ (see Park, 2000, pp. 11–16 and Barbosa-Filho, 2000, p. 31). As to the conclusion that equilibrium growth is governed by capacity saving, Park (2000, p. 8) and Barbosa-Filho (2000, p. 31) showed the existence of two solutions of this analysis. The first, which is locally stable, confirms that growth is governed by capacity saving. The second, which is unstable, implies that income grows at the same rate as the independent component of demand, if the latter has certain properties.
35. For an analysis of Kaldor's views on growth and cumulative causation, see Thirlwall (1987) and Ricoy (1987; 1998). They describe several aspects of Kaldor's position, including the role of technical progress and structural change, and his idea of growth as a path-dependent process. In what follows, we mainly focus on the role of demand in the growth process, paying less attention to other equally relevant aspects of his vision of the topic.
36. This is the literature that moves from the contributions of Nelson and Winter (1974, 1977, 1982), examined by Santangelo's chapter (10) in this volume.
37. In 1972 Kaldor further integrated Young's analysis with the Keynesian principle of effective demand, examining the role played by the demand for investment and focusing on the conditions allowing self-sustained growth. In this contribution, he argued that growth is a fragile process. In order to work it requires that several things simultaneously occur: investors must have confidence in the expansion of the markets; the credit and financial sectors have to accommodate the needs of trade; the distributive sector has to bring about price stability. According to Kaldor, after the 1930s, Government intervention secured the smooth working of the process by demand-management policies (Kaldor, 1972, p. 1252).

38. As stated above, Kaldor borrowed this relationship from Hicks' super-multiplier. Following standard notation, $I + X = S + M$ is the commodity market equilibrium condition for an open economy without public sector. If we assume that $S = sY$, $I = \kappa Y$ and $M = \mu Y$, the equilibrium level of income is given by $Y = \alpha X$, where $\alpha = 1/(s - \kappa + \mu)$ is Hicks' super-multiplier. In terms of rates of change, we get $g = \alpha(X/Y)\hat{x}$. Since $\alpha = dY/dX$ and, by definition, $\gamma = (dY/dX)(X/Y)$, the rate of change of income simply reduces to (6.63).
39. Dixon and Thirlwall (1975, pp. 208–10) point out that a_0 is determined by the autonomous rate of disembodied technical progress, by the autonomous rate of capital accumulation per worker and the extent to which technical progress is embodied in capital accumulation. λ is instead determined by the induced rate of disembodied technical progress, by the degree to which capital accumulation is induced by growth and the extent to which technical progress is embodied in capital accumulation.
40. The stability condition of the model is $|\gamma\eta_x\lambda| < 1$, which, in their opinion (1975, p. 208), may be plausibly assumed to hold. As a consequence, since $\eta_x < 0$, in equation (6.67) g is related positively to γ, a_0, $\hat{p}_f$, $\hat{e}$, ε_x, g_f and λ, and negatively to $\hat{w}$ and $\hat{\pi}$. The effects of variations of η_x are not determined. Notice too that recently Setterfield (1997) has presented an analysis, similar to that of Dixon and Thirlwall (1975), in order to study the movements of the economy out of equilibrium.
41. See Dixon and Thirlwall (1975, p. 209). Notice that, on the contrary, Kaldor (1966, p. 147) assumes that the differences in the rate of change of money wages of different regions do not counter-balance the reduction in costs due to the different rate of change of productivity.
42. To empirically estimate the influence of the composition of demand on productivity, Kaldor (1966) also used an expression, which differs from our equation (66) only in introducing, as an additional variable, the ratio of investment to output. His analysis showed that this variable explained the divergence of the rate of change of productivity from the trend determined by the original equation (66). It explains the residual change in productivity, not explained by increasing returns.
43. In the subsequent years, Kaldor changed this position too: 'In this respect I now feel I was mistaken. Events since 1971 have shown that the exchange rate is neither as easy to manipulate nor as rewarding in its effect on the rate of growth of net exports as I have thought' (Kaldor, 1978a, p. XXV).
44. Let $Y = D + X$, where Y is income, D is the demand for domestic products and X is exports. By definition $\gamma = \omega_x(dD + dX)/dX$, where ω_x is the ratio of exports to income. Since $(dD/dX)\omega_x = (dD/dY)(dY/dX)\omega_x = (dD/dY)\gamma$ and $\omega_x = 1 - \omega_D$ we can write $\gamma = (1 - \omega_D)/(1 - dD/dY)$. Finally, from the definition of the income elasticity of demand for domestic products ε_D, we get $\gamma = (1 - \omega_D)/(1 - \omega_D\varepsilon_D)$.
45. This view was already presented in Kaldor (1958), as stated in Section 6.3 above.
46. See Wilson (1976), Ball, Burns and Laury (1977). Long-run stability in the terms of trade may alternatively rely either on arbitrage or on wage-resistance forcing domestic prices to move equiproportionately to exchange rate depreciations so that $\hat{p} - \hat{p}_f - \hat{e} = 0$ (Thirlwall, 1979, p. 283).
47. According to McCombie and Thirlwall (1994, p. 233), there are a number of possible mechanisms through which capacity growth may adjust to demand growth: 'the encouragement to invest which would augment the capital stock and bring with it technological progress; the supply of labour may increase by the entry of the workforce of people previously outside or from abroad; the movement of factors of production from low productivity to high productivity sectors, and the ability to import more may increase capacity by making domestic resources more productive'. On this point, see also Thirlwall (1986, pp. 214–15) and McCombie (1998, pp. 238–9).

48. See McCombie (1993, p. 481), who quotes extensive empirical evidence showing that income elasticities are not related to the differing product mixes of the exports of the various countries.
49. It is worth noting that alternative ways of interpreting the foreign trade multipliers may lead to less pessimistic conclusions. Bairam (1993), for example, shows the existence of a statistically significant inverse relationship between the $\varepsilon_x/\varepsilon_m$ ratio and the stage of economic development of the country, proxied by per-capita output. Such a relationship implies that developing countries are less balance-of-payments constrained than developed countries, and therefore provides some support for the 'catching-up' hypothesis: if developing countries are able to grow quicker than developed ones, GDP levels will inevitably converge in the long-run.
50. See McCombie and Thirlwall (1994, 434). Kaldor himself (1981, p. 602) admitted the utility of the simplified model. In the same essay, Kaldor assumed that the sum of the marginal propensities to consume and invest is equal to unity. This assumption transforms Hicks' supermultiplier into Harrod's multiplier. If we also assume $\eta_x = 0$, equation (67) collapses to the dynamic foreign trade multiplier. Note that the assumption $c + \kappa = 1$ has also been used in the Cambridge Economic Policy Group model. On this point see also Targetti (1991).