



THE UNIVERSITY OF SYDNEY

Economics Working Paper Series

2011

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Approach**

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February 2011

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Abstract

This paper develops upon the Keynesian theory of demand-led growth in order to provide an analytical framework conducive to explaining economic growth and development in concrete terms consistent with the fundamental idea that growth in output and employment is determined by the growth in aggregate demand. The framework employs an historical approach to identify the main factors and their role in explaining demand-led growth and the accumulation process. The theoretical model developed abandons steady-state conditions by proposing that capacity utilization varies in the long run as well as in the short run to ensure output has the elasticity to accommodate levels of autonomous demand free of any capacity saving constraint. On the basis of our analytical framework, the paper considers the main factors which explain the growth in aggregate demand: first, by examining the variables that determine the ‘super-multiplier’ and what social, institutional and technical conditions can cause its value to change over time; second, by identifying the components of autonomous demand and the main forces explaining their growth; and third, by considering the manner in which technical progress promotes demand-led growth.

Keywords: growth theory, Keynesian demand-led growth, classical economics, economic history

Demand-Led Growth Theory: An Historical Approach

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1. Introduction

In the field of economic history as well as that of economic theory there has been a tendency to overemphasize the factor of supply. Precisely as classical economists were inclined to accept demand as given and constant, most economic historians of the nineteenth century concerned themselves with a detailed analysis of changes in the technique of production, the decay and expansion of certain industries, the effects of power machinery upon production, and so on. Little attention has been paid to changes in the nature of demand, even to the undoubted extension of demand, and especially is it true that the mechanism by which these changes occurred has been overlooked. Labour, as well, has been considered rather as a factor in production than as the major portion of the consuming public. When demand has been touched upon at all, it was usually dealt with in vague and general terms, with reference to Adam Smith's theory of the extension of the market.

Elizabeth Gilboy ([1932] 1967, p. 119)

The tendency to explain growth by reference to supply-side rather than demand-side forces remains true today. Of course this comment was written by historian, Elizabeth Gilboy, prior to the Keynesian revolution of the 1930s when, for the very first time, economists and economic historians alike could be informed by a coherent theory to conceive of demand playing a leading role in the determination of the growth in output and employment. This paper is concerned with how economic growth is explained by reference to forces which influence the growth in aggregate demand. It proceeds by

¹ I am grateful to Tony Aspromourgos, John King, Heinz Kurz, Rod O'Donnell and Attilio Trezzini for some valuable comments on draft versions of this paper without implicating them in the present product.

developing upon the Keynesian theory of demand-led growth consistent with the framework of the classical economist's 'surplus' approach to value and distribution. Based on our theory, the paper employs an historical approach to identify the main forces and their role in explaining economic growth. In this regard, from the standpoint of demand-led theory the growth process is considered to be a complex process, entailing structural change of the economic system, such that it can only be plausibly explained in concrete terms by reference to social, politico-institutional and technological factors. All these factors have an historical dimension in explaining growth.

The essential purpose of this paper is to provide an analytical framework for explaining growth in concrete terms by reference to history consistent with the view that economic growth is fundamentally determined by the growth in aggregate demand.² A demand-led theory of growth supposes that the level of aggregate output is determined in the long run by aggregate demand in which saving endogenously adjusts to autonomous demand through changes in income and output associated with the adjustment of productive capacity to aggregate demand. In this approach it is the growth in demand which determines the growth in output and the rate of capital accumulation. It is assumed that there is no technological constraint on output adjusting to demand growth (see below, pp. 29-30, 32-3). Importantly, the key factors in explaining growth, notably, technical progress, are conceived to contribute to economic growth through their effect on the growth in demand.

A characteristic of this approach, which clearly distinguishes it from supply-side growth theory developed on the basis of marginalist principles, is that no price mechanisms can be supposed to exist which assure the growth path is always associated with the full utilisation of productive resources. Indeed, as is well known, on its own the Keynesian approach provides no basis for supposing that demand will necessarily grow at a rate sufficient to bring about the full employment of labour along a growth path. In this

² In our view this approach is consistent with the methodology employed by Adam Smith in the *Wealth of Nations* (1776), in which a theoretical system informs an historical analysis of the major forces determining economic development. The important property of Smith's theoretical system is that it is open to social and institutional factors playing a key explanatory role that can only be properly understood by reference to their history. On Adam Smith's position, see Aspromourgos (2009, pp. 247-51).

connection the proposed compatibility between a Keynesian theory of growth and the ‘surplus’ approach to value and distribution of classical economics entails a rejection of any functional relationship between the quantity of inputs to be employed productively and the (relative) prices of those inputs. The reason for this is that the surplus approach, as reconstructed by Sraffa (1960) on the basis of the theoretical contributions of the classical economists and Marx, is characterised by an analytical separability between on the one hand the determination of long period normal prices and distribution and on the other hand the determination of outputs and the aggregate level of output as well as employment. This means that at any long-period positions along a growth path the determination of normal distribution and prices is conceived to correspond with the determination of long-run equilibrium levels of aggregate output at which demand is not necessarily sufficient to bring about the full employment of productive inputs.

Our main concern will be with constructing an analytical framework that identifies the complex of factors that inform a historically-based explanation of growth and economic development consistent with demand-led theory. In section 2 of the paper we build a ‘super-multiplier’ growth model in which utilisation of an economy’s productive capacity is assumed to always correspond to a *given* normal utilisation of capacity. On the basis of this assumption we derive a familiar ‘steady-state’ growth model in which output and the capital stock are conceived to constantly grow at the same rate for a given technique. It is shown however that such a growth model is not truly consistent with the fundamental Keynesian conception that in the long-run demand is autonomous of saving in the determination of output along a growth path. In section 3 we construct an alternative growth model, independent of steady-state conditions, in which the utilisation of capacity is conceived to vary both in the short and in the long run. Based on this conception the long-run average utilisation of capacity is endogenously determined and is systematically different from normal capacity utilisation. A novel feature of the model is that it is based on historical periodization so that trend economic growth from one period to the next is determined not only by the growth rate of autonomous demand but also by long-run changes in the value of the super-multiplier. In section 4 the contributing factors conceived to determine the super-multiplier and long-run changes in it are considered in

some detail, showing that its value is much dependent on the history of the accumulation process. Section 5 is concerned with identifying the components of autonomous demand and the main kind of factors which explain their growth. In section 6 a key feature of demand-led growth theory and the limitations of our model are considered. By reason of the familiar limitations in growth analysis, the model constructed in section 3 assumes a given technique (in each historical period) so that technical change is not properly considered. In section 7 we consider separately how in our demand-led theory technical progress contributes to growth by promoting the growth in aggregate demand in which consumption is seen to play an important role in the process. Finally, in section 8, by way of conclusion we briefly consider the role of macroeconomic policy in explaining demand-led growth.

2. The Growth Model with Normal Utilisation

The Keynesian demand-led growth model employed will incorporate a ‘super-multiplier’ of induced expenditure originally developed by Hicks (1950) which links quantitatively autonomous demand to equilibrium output and income. This super-multiplier model has been recently articulated in the literature, notably by Serrano (1995) and, from a critical disposition, by Trezzini (1995; 1998). A feature of this model is that productive capacity is determined by long-run aggregate demand. In this model there are three basic components of aggregate demand (AD_t), consisting of autonomous demand (A_t), induced consumption expenditure ($c_t Y_t$) and induced investment (I_t^I) which also contributes to productive capacity:

$$AD_t = A_t + c_t Y_t + I_t^I \quad (1)$$

where c_t is society’s marginal propensity to consume with values $0 < c_t < 1$. The first component, autonomous demand, consists of those expenditures that are explained independent of changes in income and output occurring over the same time period. It is essentially that part of aggregate demand which, along with induced investment, is

accommodated by saving (including taxation) that is endogenously generated by income. In a closed economy these expenditures consist of government expenditure, autonomous investment and autonomous consumption; while, in an open economy, it includes exports, though different to other components, is accommodated by foreign income and when less than imports the margin of difference is accommodated by foreign saving. For simplicity, we shall assume a closed economy for the time being. These components of autonomous demand in relation to both a closed and open economy will be considered in more detail and better clarified in Section 5. Until then, for simplicity, we shall also assume that autonomous demand does not create additional productive capacity – that is, it is non-capacity-generating expenditure. The second component, induced consumption, is that consumption which is a positive function of the current level of income and output. As is well known, its relationship to income is defined by the marginal propensity to consume whose value is conceived to depend on socio-institutional factors, most notably, the distribution of income and, connectedly, the taxation and welfare system.

The third component is induced investment, through which productive capacity is conceived to adjust to aggregate demand. Based on the accelerator principle, induced investment will depend on the amount of productive capacity that needs to be installed for a given technique of production to ensure the level of output accommodates expected demand. For simplicity, we will assume there is no fixed capital (i.e. a circulating capital model) and employ a rigid accelerator to express induced investment in a familiar way as:

$$I_t^I = (K_{t+1} - K_t) = a_t(Y_{t+1}^e - Y_t) \quad (2)$$

where K_{t+1} is the capital stock required in the future period to accommodate the expected level of demand, Y_{t+1}^e , and a is the capital-output ratio. In order to account explicitly for the role of capacity utilisation the capital-output ratio can be expressed as a/u , determined as follows:

$$K_t/Y_t = (K_t/Y_t^*). (Y_t^*/Y_t) = a_t/u_t \quad (3)$$

where a_t is the capital-output ratio, K_t/Y_t^* , when capacity is fully utilised (i.e. $u_t = 1$) and u_t is the degree of capacity utilisation, defined as the ratio of actual output to full-capacity output, Y_t/Y_t^* , for a given capital stock. Re-arranging equation (3) we obtain an expression for capacity utilisation:

$$u_t = a_t Y_t / K_t \quad (4)$$

On the plausible assumption that firms install productive capacity to normally produce with spare capacity to meet peak demand as well as to enable an expansion in output to capture greater sales revenue in the event of a persistent higher demand, the degree of normal (or desired) utilisation, u_t^n , will have a value between zero and full-capacity (i.e. $0 < u_t^n < 1$).³ Given that u_t^n is the ratio of the desired level of output produced as a ratio of the full-capacity of installed capital, Y_t^d / Y_t^* , then the desired capital-output ratio, a_t / u_t^n , is determined as follows:

$$K_t / Y_t^d = (K_t / Y_t^*) \cdot (Y_t^* / Y_t^d) = a_t / u_t^n \quad (5)$$

And, therefore:

$$u_t^n = a_t Y_t^d / K_t \quad (6)$$

In short, normal utilisation for an economic system is that which reflects the utilisation of capacity that firms determine will maximise their profit rates for a given technique and with consideration of the possible fluctuations in actual demand and its impact on average costs over a period of time relevant to the installation of their existing capacity. A more detailed consideration of normal utilisation is provided below in Section 4. Upon this basis equation (2) for induced investment is re-written as:

$$I_t^i = (K_{t+1}^d - K_t) = (a_t / u_t^n) (Y_{t+1}^e - Y_t) \quad (7)$$

³ The notion that firms would permanently maintain excess productive capacity is originally attributable to Steindl (1952, pp. 4-14). Besides accommodating peak fluctuations in demand, Steindl (ibid.) argued that a 'more general reason' for excess capacity was that in competing with rivals, firms wanted to be in a position to expand their market share and establish their 'goodwill' in being able to reliably supply greater demand in the market.

where K_{t+1}^d is the capital stock *desired* in the future period based on the expected level of demand, Y_{t+1}^e , and the *desired* capital-output ratio a/u_t^n as based on the dominant techniques of production and the normal utilisation of productive capacity. This accelerator relationship supposes that through time net investment ensures the capital stock adjusts to produce output levels according to the desired capital-output ratio.

By substituting equation (7) for I_t in equation (1) we obtain the following aggregate demand function:

$$AD_t = A_t + c_t Y_t + (a/u_t^n) (Y_{t+1}^e - Y_t) \quad (8)$$

Solving for equilibrium income:

$$Y_t = A_t + c_t Y_t + (a/u_t^n) (Y_{t+1}^e - Y_t) \quad (9)$$

and, with expected growth in output, $g_t^e = (Y_{t+1}^e - Y_t)/Y_t$ and, re-arranging, we obtain:

$$Y_t = A_t / [1 - c_t - (a/u_t^n) g_t^e] \quad (10)$$

If it is then assumed firms have perfect foresight, expected growth, g_t^e , will be equal to the growth rate of output (and income), g_t^y . And if we substitute the propensity to save, s_t , for $1 - c_t$, the following expression is obtained:

$$Y_t = A_t / [s_t - (a/u_t^n) g_t^y] \quad (11)$$

A positive value of Y_t requires that given $0 < s_t \leq 1$, $s_t > (a/u_t^n) g_t^y$. The equilibrium income so determined can be called 'capacity income' because it corresponds to a level of output produced at the normal utilisation of capacity. By re-arranging equation (11) a familiar growth equation for a super-multiplier model is obtained:

$$g_t^y = [s_t - (A_t/Y_t)] / (a/u_t^n) \quad (12)$$

The equilibrium growth rate, g^y_t , is determined by the ratio A_t/Y_t for a range of possible values up to a maximum value of $g^y_t = s_t/(a_t/u_t^n)$, when $A_t = 0$. This equilibrium growth is that necessary to ensure capacity saving, being that level of saving which is generated from income when output is produced at the normal utilisation of capacity is equal to autonomous expenditure plus induced investment.⁴ It is also the growth rate at which the degree of utilisation conforms continuously to normal utilisation along a steady state growth path in which the capital stock and output continuously grow at the same rate for a given technique of production.

A major problem with this steady-state growth model is that it is not really compatible with the fundamental Keynesian notion that demand is autonomous in the determination of the trend growth of output (Trezzi 1995, pp. 48-56). This can be explained by reference to the growth equation (12). According to this equation, for the given ratio A_t/Y_t which determines g^y_t to remain constant along the trend growth path, the growth rate of autonomous demand, g^A_t , must be equal to the steady-state growth rate: i.e. $g^A_t = g^y_t$. However, this means that the growth rate of autonomous demand is limited in the sense that $g^A_t < s_t/(a_t/u_t^n)$ consistent with $A_t > 0$, where $s_t/(a_t/u_t^n)$ is capacity saving as a ratio of the capital stock.⁵ The reason for this limitation in the model is that growth in autonomous demand, which is equal to or greater than $s_t/(a_t/u_t^d)$, cannot be accommodated by the growth in capacity saving necessary for equilibrium along the steady-state growth path. If demand is truly autonomous there appears no logical reason why its growth should be so bound by capacity saving. Connected to this is the peculiarity in equation (12) of the inverse relationship between the ratio A_t/Y_t and g^A_t on the basis of $g^A_t = g^y_t$ and for given values of s_t , a_t and u_t^n . Again, if demand is truly

⁴ This is simply given by the following equation:

$$s_t Y_t = A_t + (a_t/u_t^n)(Y_{t+1}^e - Y_t) \quad (13)$$

where it is assumed $Y_t > Y_t^+$ and, given the existence of positive autonomous consumption, C^A , $s_t Y_t^+ = C^A$. This condition is necessary in a global (or closed) economy for saving net of autonomous consumption to be positive (i.e. $s_t Y_t > C^A$). On autonomous consumption, see section 5 below.

⁵ By re-arrangement we can obtain a more comprehensible form for this term. Substituting K_t/Y_t^* for a_t into the term $s_t/(a_t/u_t^d)$ obtains $s_t/(K_t/Y_t^*/u_t^d)$ and then, by re-arrangement, to $s_t(Y_t^* u_t^d)/K_t$. This simplifies to $s_t Y_t / K_t$, where it is recalled that Y_t is capacity income.

autonomous there is no plausible basis for supposing that its growth should systematically increase as the ratio of autonomous demand to capacity income (i.e. A_t/Y_t) decreases and, *vice-versa* (Trezzini 1995, pp. 52-3). In the steady-state growth model the logic for this inverse relationship is that as the magnitude of the latter ratio decreases (increases) an increasing (decreasing) proportion of capacity saving can be devoted toward induced investment and, thereby, toward augmenting (diminishing) the growth in capacity, its output and, causally, in the demand necessary to realize equilibrium growth. Hence, in this steady-state model the growth in autonomous demand ultimately depends on saving which is generated by the equilibrium growth in capacity income. This underlies the lack of autonomy of demand in the growth process when the trend rate of output growth and the saving which is generated by it is based on a *given* normal utilisation of capacity.

Our argument then is that under steady-state conditions in which it is supposed that there is a given normal utilisation of capacity along the trend growth path aggregate demand is denied an autonomous role in the determination of economic growth. Nevertheless, as shown by Garegnani (1992), this theoretical problem can be surmounted by allowing the degree of capacity utilisation to vary both in the short and long run so that any level of autonomous demand (investment) can be accommodated by the generation of saving induced through changes in income and output facilitated by changes in capacity utilisation as well as in productive capacity. By allowing for persistent as well as temporary variations in the utilisation of capacity, long run output has the elasticity to accommodate changes in aggregate demand beyond the steady-state for a given propensity to save (*ibid.*).⁶ Importantly, this variability in capacity utilisation

⁶ This conception was largely proposed by Garegnani (1992) as a critique of the Cambridge conception that distribution was dependent on the rate of capital accumulation, which had been variously advanced by Kaldor (1955-1956, pp. 94-100), Kahn (1959), Robinson (1962, pp. 11-13, 40-41) and Marglin (1984). In the Cambridge conception the limit to growth posed by existing capacity saving is essentially surmounted by generating growth in autonomous demand sufficient to cause a change in distribution which, in turn, induces a higher propensity to save so that additional saving is generated to accommodate the additional autonomous demand. This can be illustrated by reference to equation 12 above. Suppose, through government policy, g^A_t is increased to a rate which is higher than the existing g^y_t . This expansion in demand then, through an inflation process, brings about a redistribution of income from wages to profits, which, on the plausible assumption that the propensity to save of capitalists is higher than wage-earners, causes the value of s_t to increase so producing an increase in capacity saving necessary to facilitate the expansion in

ensures that aggregate demand has an autonomous role in the growth process which is crucial to the Keynesian approach (see Trezzini 1995, pp. 48-57; Palumbo and Trezzini 2003, pp. 110-114). It is clear though that this conception of the growth process is not reconcilable with steady-state growth since the capital stock and output will be systematically growing at different rates.

3. An Alternative Growth Model with Endogenous Utilisation

In an attempt to incorporate long-run elasticity of output into a super-multiplier growth model Serrano (1995) proposed that consistent with variability in capacity utilisation the *average* utilisation of capacity which emerged over time would be the same as the normal utilisation of capacity. Unlike the steady-state model, the utilisation of capacity is not assumed to be constant but rather the *given* normal utilisation of capacity is proposed to correspond to an average of its fluctuations over time. This conception therefore brings in historical time with all the variables expressed as averages, including the expected growth in demand of firms, in the determination of an average rate of growth. To express this conception equation (12) can be re-written as:

$$g^y_t = [s_t - (A_t/Y_t)] / (a_t/u^a_t) \quad (14)$$

where u^a_t is the average utilisation of capacity and $u^a_t = u^n_t$.

The problem with this conception is that there appears to be no compelling reason why the average utilisation of capacity which emerges over time should be equal to the normal

autonomous expenditure. In this way the value of g^y_t will then adjust to a policy-determined g^A_t . It is supposed that in this process the resulting increase in the rate of capital accumulation will be associated with a higher rate of profit and, for a given technique, a lower real wage. In contrast, according to Garegnani's (1992) proposition, g^y_t can adjust to a higher g^A_t without any change in distribution by the degree of utilisation increasing in the long run. The increase in income (output) derived from a higher degree of utilisation of productive capacity is then able to generate the necessary saving to facilitate the additional autonomous demand. Importantly, this argument entails the rejection of a given normal utilisation and, thereby, of a steady-state growth model. For other related criticisms of the Cambridge approach to growth and distribution, see Vianello (1985), Ciccone (1986) and Garegnani and Palumbo (1998).

utilisation of capacity. Indeed, as shown by Trezzini (1998, pp. 59-66), even on the assumption of perfect foresight, any deviation of actual growth from the equilibrium growth rate associated with a normal utilisation of productive capacity will require average utilisation to significantly vary from normal over a considerable period of time to restore the equilibrium rate of growth. Furthermore, the process of adjustment itself can cause the growth in capacity to change in relation to output growth since changes in utilisation which, in the long-run, affect capacity, simultaneously affect demand. Moreover, in the long-run adjustment of capacity to demand, investment induced by deviations of average from normal utilisation will simultaneously affect demand as well as productive capacity. Hence, as Palumbo and Trezzini (2003, pp. 115-120) have argued, once it is acknowledged that the utilisation of capacity may vary such as to ensure long-run elasticity in output that can accommodate any possible level of aggregate demand, then the adjustment process of capacity to demand is a path dependent one that means average utilisation is, except by rare coincidence, unlikely to be equal to normal utilisation notwithstanding investment decisions by firms to achieve it.

The question is where do these analytical issues leave our demand-led growth theory? The answer is a more modest theory which does not pretend *to fully account* for the growth process but nevertheless provides a framework for analysing the central causes of *trend growth and economic development* in a more concrete way consistent with the notion that the growth in aggregate output is fundamentally determined by the growth in aggregate demand. We propose an historical approach, suggestive in Serrano (1995),⁷ in which the growth model provides a demand-led framework for a concrete explanation of the average growth rate over historical time periods, which we will call ‘epochs’. These epochs are defined arbitrarily according to their significance in explaining growth trends by reference to key historical events as well as to the character of the demand-led forces which are ascertained to determine economic development and growth performance. Thus, for example, an epoch could be defined by reference to the event of war, a change in the international economic regime, a fundamental change in policy-making, an unprecedented structural change in the economic system or by a combination of these or

⁷ Also see Kaldor (1957, p. 601 n.1).

other such historically related events. The theoretical counterpart to epoch in our model is ‘period’ in which the average long-run *equilibrium* growth rate is conceived to be determined by the persistent forces of demand specified in our demand-led theory. In this approach the equilibrium growth rate in each period is conceived to be linked to that of the previous period so that growth in period t can only be properly explained by reference to the history of the growth process in period $t-1$ and, prior to this, period $t-2$ and so on backward to period $t-n$. Hence, the average long-run equilibrium growth rate in any period is determined by demand-led forces which have an historical context and, in concrete terms, are to be explained by reference to history. As will become clear below, the long run of our periods, to which epochs correspond, are, at a minimum, long enough for fixed productive capacity to adjust to expected demand conditions consistent with long-run equilibrium growth.

In accord with the foregoing conception of long-run elasticity in which changes in the degree of capacity utilisation play an active role in the adjustment of saving to autonomous demand (and induced investment) along with output adjusting to aggregate demand, our model shall suppose that the utilisation of capacity is endogenously determined in the growth process. This means that in any period the average utilisation of capacity is conceived to be endogenously determined.⁸ Based on the reasoning given above, the average utilisation so determined is not conceived, except by coincidence, to equal the normal utilisation of capacity upon which firms base their investment decisions in adjusting their capacity to demand. Secondly, in our model the unrealistic assumption of perfect foresight is dispensed with such that firm’s expected growth of demand is not necessarily equal to its actual growth. While we acknowledge that firms will continuously adjust their expectations of growth in demand to historical growth rates, unless the growth rate is stable for a very long period of time it is not plausible to assume that their expectations will be systematically correct. Once steady state growth is abandoned and the growth rate is conceived to be determined by demand in a path dependent way perfect foresight has little plausibility. Thirdly, our model will take a more general form and suppose the existence of fixed capital. This means we must

⁸ This appears to be consistent with the conception briefly outlined by Ciccone (1987, pp. 103-106).

account for the effect of the rate of depreciation of the capital stock on induced investment by re-writing equation (2) above to:

$$I_t^I = (a_t/u_t^n)(Y_{t+1}^e - Y_t) + (a_t u_t^n d_t) Y_t \quad (15)$$

where I_t^I is induced investment and d_t is the average rate of depreciation of *utilised* capital in period t . The second term on the right-hand side of equation (15) clearly expresses the notion that the rate of depreciation of the capital stock increases with its utilisation. With respect to the effect of depreciation on induced investment, the equation shows that induced investment in our model is conceived to be based on the rate of depreciation expected by firms to occur *at the normal utilisation* of the capital stock. However, because average utilisation will be systematically different to normal, the depreciation of the capital stock which occurs will be systematically different to that expected. As is elaborated below, this unexpected depreciation of the capital stock can influence *future* induced investment by, in turn, contributing to the deviation of average from normal utilisation.

Fourthly, since the degree of utilisation of capacity that is realised will, except by accident, be different from normal, we need to account for the effect of this systematic deviation on induced investment. In doing so, the model is able to account, however mechanically, for the manner in which capacity is conceived to adjust to aggregate demand in a demand-led growth theory. It is proposed that deviations of average utilisation from normal realised in the previous historical period $t-1$ induce a change in investment in the current period t by firms endeavouring to adjust their capacity to demand so as to re-establish normal utilisation. We are supposing that period $t-1$ is sufficiently long that the deviation between average and normal utilisation can be considered ‘systematic’ and firms can feasibly adjust their capacity in period t to expected demand conditions in the future period $t+1$. Incorporating this conception into the determination of induced investment, equation (15) above is re-written as:

$$I_t^l = (a_t/u_t^n) (Y_{t+1}^e - Y_t) + a_t u_t^n d_t Y_t + (a_t/u_t^n - a_t/u_{t-1}^a) Y_t \quad (16)$$

where u_{t-1}^a is the average degree of utilisation realised in period $t-1$ and the term $(a_t/u_t^n - a_t/u_{t-1}^a)Y_t$ reflects the adjustment of capacity to demand to restore normal utilisation.⁹ By re-expressing equation (16) it can be easily shown that *net* of the expected depreciation of capital, induced investment is the difference between the capital stock desired by firms to accommodate expected demand in period $t+1$ at normal capacity utilisation, K_{t+1}^d , and what the capital stock will otherwise be in period t at the existing average utilisation of capacity determined in period $t-1$, denoted as K_t^r :

$$I_t^l - (a_t u_t^n d_t) Y_t = (K_{t+1}^d - K_t^r) = (a_t/u_t^n) Y_{t+1}^e - (a_t/u_{t-1}^a) Y_t \quad (17)$$

where $I_t^l - (a_t u_t^n d_t) Y_t$ is induced investment *net* of expected depreciation of the capital stock. It will be convenient for our purposes below to employ equation (16) rather than equation (17). However, what this latter equation shows is that whereas in steady-state and other models discussed above induced investment changes at the same constant rate as output (and income) in our model it changes at a different rate from one period to the next according to changes in average utilisation brought about by unexpected changes in the growth rate of demand.¹⁰ Accordingly, for this reason alone, the capital stock tends to grow at a different rate from one period to the next in our model.

These elements can be represented in our model by re-writing equation (9) above as follows:

$$Y_t = A_t / [1 - c_t - (a_t/u_t^n) g_t^e - a_t u_t^n d_t - (a_t/u_t^n - a_t/u_{t-1}^a)] \quad (18)$$

⁹ With respect to the third term on the right-hand side of equation (16) if we denote K_t^n as the capital stock with normal utilization and K_t^r the capital stock that would be realized in period t based on the average utilization in period $t-1$, then $K_t^n - K_t^r = (a_t/u_t^n - a_t/u_{t-1}^a) Y_t$. Hence, for example, if $u_{t-1}^a > u_t^n$, this means for an existing level of demand and output, Y_t , the capital stock that would be realised without any adjustment to induced investment in period t , K_t^r , is smaller than necessary for aggregate production to occur at a normal degree of utilisation; that is, $K_t^n > K_t^r$.

¹⁰ Note that $I_{t-1}^l - a_{t-1} u_{t-1}^n d_{t-1} Y_{t-1} = (K_t^d - K_{t-1}^r) = a_{t-1} u_{t-1}^n Y_t^e - a_{t-1} / u_{t-2}^a Y_{t-1}$, $I_{t-2}^l - a_{t-2} u_{t-2}^n d_{t-2} Y_{t-2} = (K_{t-1}^d - K_{t-2}^r) = a_{t-2} / u_{t-2}^n Y_{t-1}^e - a_{t-2} / u_{t-3}^a Y_{t-2}$, ... and so on.

where all variables are expressed as ‘averages’ so that g_t^e refers to the expected average growth in demand in period t and the condition $1 > [c_t + (a_t/u_t^n)g_t^e + a_t u_t^n d_t + (a_t/u_t^n - a_t/u_{t-1}^a)]$ is met. In absence of perfect foresight, expected average growth in demand (and hence, in output) will not be equal to the average growth in output in period t , g_t^y , such that $g_t^e \neq g_t^y$. Given the values of c_t (or s_t), a_t , d_t , u_t^n , u_{t-1}^a and g_t^e , which together determine the super multiplier, and the level of autonomous demand, A_t , equilibrium income and output is determined.¹¹ On the basis of this datum and the historically *given* capital stock (i.e. K_t) employed to produce output (i.e. Y_t) in period t , the average utilisation of capacity, u_t^a , will be endogenously determined as follows:

$$u_t^a = a_t Y_t / K_t \quad (20)$$

and with $g_t^e \neq g_t^y$, then $u_t^a \neq u_t^n$. Hence, except when $g_t^e = g_t^y$, the average utilisation of capacity will be systematically different from normal and average utilisation will vary from one period to the next such that $u_t^a \neq u_{t-1}^a$. The capital stock to determine average utilisation of capacity in period t in equation (19) is itself determined historically in the following way:¹²

$$K_t = K_{t-1} + I_{t-1}^l + (u_{t-1}^n - u_{t-1}^a) a_{t-1} d_{t-1} Y_{t-1} \quad (21)$$

The term $(u_{t-1}^n - u_{t-1}^a) a_{t-1} d_{t-1} Y_{t-1}$ in equation (21) is the average depreciation of the capital stock in period $t-1$ which was *not expected* by firms when, through induced investment

¹¹ This equilibrium corresponds to equality between saving and autonomous expenditure *plus* induced investment, expressed as follows:

$$sY_t = A_t + a_t/u_t^n (Y_{t+1}^e - Y_t) + a_t u_t^n d_t Y_t + (a_t/u_t^n - a_t/u_{t-1}^a) Y_t \quad (19)$$

where the condition $Y_t > Y_t^+$ is met (see n. 4). Given the propensity to save, the level of saving adjusts, *via* the super-multiplier, to any given level of autonomous expenditure *plus* capacity-adjusting investment through changes in the long-run level of income (i.e. Y_t).

¹² The capital stock can also be shown to be historically determined by reference to saving endogenously generated by income, as follows:

$$K_t = K_{t-1} + sY_{t-1} - A_{t-1} + (u_{t-1}^n - u_{t-1}^a) a_{t-1} d_{t-1} Y_{t-1} \quad (21a)$$

where A_t is the autonomous demand in period $t-1$ which absorbs part of saving but is assumed not to be adding to productive capacity.

(i.e. I'_{t-1}), they installed capacity to accommodate expected demand in period t (i.e. Y^e_t). Unexpected depreciation so affecting the capital stock is conceived to be systematic on account of the systematic difference between average and normal utilisation. Hence, for example, if $u^a_{t-1} > u^n_{t-1}$ because $g^e_{t-1} < g^y_{t-1}$, the depreciation of the capital stock will be greater than anticipated and, thereby, not compensated by induced investment, will tend to reduce the stock of capital available in period t . By affecting capacity in this way, unexpected depreciation will contribute to a higher average rate of utilisation determined in period t (i.e. u^a_t) and, thereby, tend to contribute to its deviation from normal utilisation which, in the manner explained above, firms will endeavour to correct through induced investment in period $t+1$.¹⁴

On the basis of the analysis above the average growth rate in period t will be equal to:

$$g^y_t = Y_t - Y_{t-1} / Y_{t-1} \quad (22)$$

where current average output, Y_t , is determined in equation (18) and output in the previous period is similarly determined according to the equation:

$$Y_{t-1} = A_{t-1} / [1 - c_{t-1} - (a_{t-1}/u^n_{t-1})g^e_{t-1} - a_{t-1}u^n_{t-1}d_{t-1} - (a_{t-1}/u^n_{t-1} - a_{t-1}/u^a_{t-2})] \quad (18a)$$

Now, for simplicity, we will denote the super-multipliers for period t and $t-1$ respectively as follows:

$$m_t = 1/[1 - c_t - (a/u^n_t)g^e_t - a_t u^n_t d_t - (a/u^n_t - a/u^a_{t-1})]$$

$$m_{t-1} = 1/[1 - c_{t-1} - (a_{t-1}/u^n_{t-1})g^e_{t-1} - a_{t-1}u^n_{t-1}d_{t-1} - (a_{t-1}/u^n_{t-1} - a_{t-1}/u^a_{t-2})] \dots\dots(23)$$

¹³ Through this historic sequence of effects on average utilization in period t , (i.e. u^a_t), the capital stock in period $t+1$ will, in turn, be affected since $K_{t+1} = K_t + I'_t + (u^n_t - u^a_t) a_t d_t Y_t$.

¹⁴ In accord with equation (16), induced investment in period $t+1$ is:

$$I'_{t+1} = (a_{t+1}/u^n_{t+1})(Y^e_{t+2} - Y_{t+1}) + a_{t+1}u^n_{t+1}d_{t+1}Y_{t+1} + (a_{t+1}/u^n_{t+1} - a_{t+1}/u^a_t)Y_{t+1} \quad (16a)$$

Hence, while higher utilisation means less capital is required per unit of output (in period t), it leads to a faster rate of depreciation of capital per unit of output which tends to induce a greater level of investment in the future (i.e. $t+1$).

The value of m_t will be different from m_{t-1} purely on the grounds that u^a_{t-1} is a different value to u^a_{t-2} . Thus, for example, even supposing $g^e_t = g^e_{t-1}$, $c_t = c_{t-1}$, $a_t = a_{t-1}$, $u^n_{t-1} = u^n_t$ and $d_t = d_{t-1}$, if $u^a_{t-1} > u^a_{t-2}$, then $m_t > m_{t-1}$. We can write the equations for the determination of equilibrium output in period t and $t-1$ in the simple form:

$$\begin{aligned} Y_t &= A_t \cdot m_t \\ Y_{t-1} &= A_{t-1} \cdot m_{t-1} \quad \dots\dots\dots \end{aligned} \quad (24)$$

Substituting equations (24) into (22) allows us to express the average growth rate of output in period t as:

$$g^y_t = A_t \cdot m_t - A_{t-1} \cdot m_{t-1} / A_{t-1} \cdot m_{t-1} \quad (25)$$

With re-arrangement and manipulation we can get the following demand-led growth equation for period t :

$$g^y_t = g^A_t + \Delta m_t (A_t/A_{t-1}) \quad (26)$$

where g^A_t is the growth rate of autonomous demand and Δm_t is the change in the super-multiplier in period t as determined by $(m_t - m_{t-1})/m_{t-1}$.¹⁵ This growth equation shows that the growth rate of output is determined by the growth rate of aggregate demand, as determined by two elements: (1) the growth rate of autonomous demand, g^A_t ; and (2) the *change* in the value of the super-multiplier, Δm_t . It is evident that if $m_t = m_{t-1}$ so that $\Delta m_t = 0$, the growth of output will be determined wholly by the growth in autonomous demand; that is, $g^y_t = g^A_t$. While the growth in autonomous demand is conceived to be the main determinant, lasting changes in the super-multiplier can be a contributor to the determination of economic growth in this model.

¹⁵ It follows from equation (20) above that the average rate of capital accumulation, g^k_t , will be equal to the average growth rate of output in period t ; that is, $g^k_t = g^y_t$.

4. The Determinants of the ‘Super-Multiplier’

The central feature of our demand-led growth model is that unlike ‘steady-state’ models the growth rate depends not only on the growth rate of autonomous demand but also on the long-run change in the value of the super-multiplier. This stems from the historical periodization we have incorporated into the model in which the super-multiplier will systematically be different from one period to next. Therefore, according to our model, trend growth is explained not just by reference to factors determining the growth of autonomous demand but also by reference to factors which can cause long-run changes in the value of the super-multiplier such as changes in income distribution, technical change and the revision of expectations by firms about long-run demand. Moreover, in our model history is considered to play a central role in determining the value of the super-multiplier which, in any period, is dependent in part on events which have occurred in previous periods. This is elaborated below in our consideration of more specific features of the model connected to the determination of the super-multiplier.

A distinctive element of demand-led growth theory is that investment decisions by firms in installing productive capacity are conceived to be based on their expectations about future demand and, related to this, on the determination of the normal utilisation of capacity. In our model the absence of perfect foresight means that expectations of the future growth of demand by firms will only be realized on rare occasions so that except on those rare occasions average utilisation will be different from normal utilisation. As shown in the previous section, it is supposed that the deviation of average from normal utilisation in one period will induce a change in capacity-adjusting investment in the next period. However, this capacity-adjustment mechanism represents a simplification of the process since the deviation between average and normal utilisation, especially in a period of stagnant economic growth, may only reflect a disparity between the actual and expected frequency of fluctuations in demand with peak demand well below full capacity. On the other hand, equality between the average and normal utilisation may merely mask a significant increase in the amplitude of fluctuations in peak demand requiring firms to make additional investment in capacity. In this respect, an underlying assumption of our

model is that firms (including public enterprises) tend to adjust capacity at discrete intervals in each period when they install planned spare capacity which will on average be utilised over time according to the expected future growth in demand. It is envisaged in our model that expectations about future demand are revised on the basis of recent history in each period with the installation of new capacity so that g_t^e is revised from g_{t-1}^e and is therefore likely to be different to g_{t-1}^e . Besides expectations about future demand, capacity-creating investment will also crucially depend on the normal degree of utilisation of the intended capacity to be installed. Normal utilisation is conceived to be also revised by firms in each period according to a changing complex of factors so that u_t^n can be different from u_{t-1}^n and so on. The degree of divergence of average from normal utilisation will clearly be a major factor in revising the normal degree of utilisation for newly installed capacity. Hence, interpreted by reference to the frequency and amplitude of fluctuations in demand (and, hence, utilisation) which have occurred, the magnitude of divergence between u_{t-1}^n and u_{t-1}^a in period $t-1$ will provide important information to firms in the determination of u_t^n in period t (Amadeo 1986, p. 155). Other major related factors which will influence the determination of normal utilisation is the technology embodied in newly installed capacity, the expected fluctuations in demand as based on historical experience and the degree of spare capacity planned for newly installed capacity (see Ciccone 1986).

Another influence on the propensity to invest is changes in the average depreciation rate, d_t , from one period to the next. A major factor affecting the depreciation rate is the age structure of the capital stock of the economy, which depends on the historical accumulation process (Duesenberry 1958, pp. 266-7). If the capital stock is of younger vintage, which usually occurs after a period of strong growth and capital accumulation, a smaller proportion of it reaches the replacement age and the depreciation rate will tend to be lower; whilst an older age distribution of the capital stock will mean the depreciation rate will tend to be higher. Technological development that improves the quality of capital equipment and the overall durability of the capital stock can also be a factor tending to reduce the depreciation rate. While a lower (higher) depreciation rate tends to reduce (increase) the propensity to invest, in our model, its effect is contingent on the rate

of utilisation of existing capacity such that a higher (lower) degree of utilisation will contribute toward a greater (smaller) rate of capital replacement and, thereby, a higher (lower) propensity to invest.

It is evident that the magnitude of the super-multiplier in our model will be different from one period to the next and, therefore, change from one period to next, according to different expectations of the growth of demand, g^e_t , the adoption of new technology, a_t , the determination of a different normal degree of capacity utilisation, u^n_t , and to a different depreciation rate, d_t , all affecting the propensity to invest. As indicated above, in absence of perfect foresight systematic differences between normal utilisation and the endogenously determined average utilisation of capacity (i.e. $u^n_t \neq u^a_t$) in any one period (t), by affecting the propensity to invest, also contributes to a different magnitude of the super-multiplier in the following period ($t-1$). In addition, principally as a result of lasting changes in income distribution, the propensity to consume, c_t , can vary so contributing to a different magnitude of the super-multiplier from one period to the next. Thus, significant variations in the magnitude of the super-multiplier between periods (with its counterpart, epochs) is conceived to principally occur as a result of social, institutional and technical changes which permanently alter the values of these variables determining the propensity of induced demand. Nevertheless, these structural changes tend to occur slowly over a long period of time such that the super-multiplier is relatively stable and is probably more stable than changes in the trend growth rate of autonomous demand. However, it should also be kept in mind that a feature of our model is that the propensity to consume, c_t , is not independent of the path of growth so that the frequency and amplitude of the fluctuation in demand in a period can influence its value. Hence, for example, a severe cyclical downturn in the economic activity could well lead to an irreversible increase in the value of c_t as households in general attempt to maintain levels of consumption and their accustomed standard of living in the face of a significant, albeit temporary, reduction in income (see Trezzini 2005).

5. Autonomous Demand and Explaining its Growth

From the standpoint of our demand-led model an explanation of growth will much consist of identifying the key factors determining the growth in autonomous demand. Autonomous demand can be defined as demand generated independent of *current* national income and is conceived to ‘set the pace’ for the determination of aggregate demand as a whole. Autonomous demand is therefore explained by reference to factors which are independent of changes in current income (and output) and the adjustment process of capacity to demand. While this definition accords with the conventional meaning employed in Keynesian theory, what kinds of demand should be considered autonomous is not straightforward and needs careful elaboration. We have already identified the components of autonomous demand for an open economy, as expressed in the following equation:

$$A_t = I^A + C^A + G + X \quad (27)$$

where I^A is autonomous private investment, C^A is autonomous private consumption, G is government expenditure and X is exports. Each of these components of autonomous demand will be explained by reference to the kind of factors which are conceived to determine them. We can then consider how our conception of autonomous demand modifies our model.

We begin with autonomous investment, I^A . Besides being induced by an expansion in demand, investment is induced by other factors that are mainly connected with competition among firms for market share in the pursuit of greater profitability. Competition induces firms to invest in product innovation, often involving considerable expenditure on research and development and, connectedly, to invest in improvements in their method of production to lower normal costs as well as to accommodate new processes necessary to produce new products. A major factor influencing this kind of investment is technical progress, including new scientific knowledge, generated itself by private as well as government investment in research and development. Importantly,

these kinds of investment in innovation are made by firms even when there is stagnating demand. Indeed, the need by firms to undertake such investment is likely to be greater when industry demand is in decline and the competition for market share is more intense (Palumbo and Trezzini 2003, p. 123). Therefore, whilst investment in innovation is motivated by a firm's desire to increase the demand for *its* output, it is not determined by whether demand is expanding or not.

While investment by firms in innovation can be associated with the creation of additional capacity it does not necessarily have to be so. The replacement of old with new more productive capital equipment, with the objective of raising productivity and reducing normal production costs, may not necessarily involve any change to the level of capacity. Similarly, a change in the production process with the objective of switching from producing an older obsolete product to a new one (e.g. a new model motor vehicle) may occur without altering existing capacity. But of course under conditions of sustained growth in demand it is very likely that such investment by firms will be associated with decisions to expand capacity. Hence, that part of the investment which creates additional capacity should be treated as induced while that which alters the technical character of existing capacity for the purposes mentioned above ought to be treated as autonomous (cf. Trezzini 1995, p. 41).¹⁶

A category of investment which in our view ought to be treated as autonomous though it does directly create additional capacity is investment in infrastructure, what development economists often call 'social overhead capital', mainly in the form of transport, communications, water storage and power-generation infrastructure. A feature of this category of investment is that it brings 'social overhead benefits' in the form of reduced costs of transportation, production processes and marketing which, by creating

¹⁶ To illustrate this distinction consider a firm has capacity of 100 machines to produce 200 units of output. Now suppose they undertake investment to replace all the existing machines with superior ones so that now the firm produces 200 units with 50 machines. This would be autonomous investment because there is no increase in capacity. But lets then suppose the firm wants to also simultaneously double capacity to meet an expected increase in demand to 400 units. The additional capacity of 200 units would require an additional 50 new machines and this would amount to induced investment. Hence, overall investment would be that required to install 100 of the new technically superior machines for a capacity of 400 units, consisting of half autonomous investment and half induced investment.

new commercial opportunities, tends to induce investment in new industries as well as the expansion of existing ones. Historical examples of this type of investment abound: the canals built in Britain during the eighteenth century and the Suez Canal constructed in the 1860s;¹⁷ the construction of railways in England in the 1830s and 1840s;¹⁸ the construction of the transcontinental railways in the United States in the 1870s;¹⁹ and, more recently, the laying out of fibre optic cable to establish a worldwide electronic telecommunications network. An important feature of this type of investment is that it requires the co-operation of the state to obtain rights of access to land, waterways and other resources to be affected and, sometimes, to employ the technology required (Deane 1979, pp. 234-37). And because the revenue of such investment projects is typically realized in the distant future and is, therefore, often uncertain, in absence of state support, they carry a high risk of commercial failure. Often it requires the financial assistance of the state. Indeed, infrastructure investment is, at least since the beginning of the twentieth century, most often financed and carried out by the state. Moreover, as the historical examples above highlight, this kind of private investment has been important to the introduction of new technologies which transform and develop economic systems. While this kind of investment is clearly based on an expectation that future demand will be sufficient to ensure the project's profitability commensurate with its risk, there is often little or no history upon which to base that expectation. Like large-scale state-funded public works, the capacity so installed initially well exceeds and precedes the demand rather than it adjusting to any expansion in demand.²⁰ Hence, this category of investment is conceived to be autonomous because it contributes toward setting the pace of aggregate demand to which most of an economy's capacity will tend to adjust through induced investment.

¹⁷ On eighteenth century canal building in Britain, see Deane (1979, pp. 78-85) and Clapham (1959, pp. 75-85). For an account of the history of the construction of the Suez Canal, see Karabell (2003).

¹⁸ On investment in early railways construction in Britain, see Reed (1975) and Clapham (1959, pp. 381-424).

¹⁹ On the construction of the transatlantic railways west across the United States, see variously, Gordon (1996), Orsi (2005), Stover (1961, pp. 66-84) and Williams (1988).

²⁰ As Schumpeter (1939, I, pp. 328-30) argued with respect to the westward construction of the railway across the United States in the mid-nineteenth century, it occurred 'ahead of demand' and, thereby, required the assistance of 'state enterprise' as well as considerable 'credit creation' to finance the large-scale investment projects. Also see Steindl's (1952, p. 11) reference to electricity generation as an example of 'building ahead of demand'.

Autonomous consumption, C^A , is that part of total consumption which is conceived to be determined by factors other than current income flows such as the rate of interest, availability of consumer credit and the value of household wealth. It is because part of consumption can be financed by current saving and/or liquidated wealth that factors other than current income can be important in explaining consumption behaviour. The kind of consumption we have in mind mostly consists of expenditure on durable consumer products such as motor vehicles, televisions, computer equipment and a whole range of household goods which are financed by consumer credit.²¹ An important type of expenditure which we believe should also be treated as part of autonomous consumption is the purchase of new housing financed from accumulated wealth and household borrowing on mortgage. While admittedly of longer duration, housing is nevertheless a durable product whose value is subject to depreciation by the consumption of household living. It should not be considered investment because, unlike commercial property, it does *not directly* contribute to production. An implication of treating newly built houses as autonomous consumption is that housing does not constitute part of the capital stock.²² Autonomous consumption is another element of expenditure which sets the pace for aggregate demand – it is, so to speak, one of the horses which can pull the cart. Indeed, with the increasing availability of consumer credit which has accompanied the institutional development of the financial system and the progressive affluence of society, autonomous consumption, as defined here, has become an increasingly important component of demand in modern capitalist economies since the Second World War.²³ In particular, mortgage-financed spending on newly constructed residential housing has been an important source of demand in some affluent countries in which home ownership

²¹ The capacity of households to service the debt acquired to purchase durable consumer goods will depend on the future growth of their disposable income (and, therefore, their saving) which, in our demand-led growth theory will depend much on the growth in autonomous demand, to which the growth in autonomous consumption can contribute.

²² In fact this is consistent with Adam Smith's (1776, II.i.12, pp. 281-2) treatment of 'dwelling houses' as part of the stock of wealth but not capital on the grounds that it did not generate 'revenue' for the economic system (Aspromourgos 2009, p. 162).

²³ It is interesting to note that in discussing the conduct of post-war demand management policy in the United Kingdom, Kaldor ([1971] 1978) indicated that fiscal policy and monetary policy in the form of credit controls which acted on consumption expenditure was the most effective way to influence economic activity. In this regard, Kaldor (ibid, p.169) referred to "consumption expenditure" as being the "prime mover" on the basis that "business investment is largely demand-induced" such that "both fiscal measures and monetary measures (credit control) operated on the economy primarily by controlling the *rate of change* of consumer expenditure".

is a realistic aspiration for the majority of the population.²⁴ Among the key factors which can influence the growth in autonomous consumption are interest rates, changes in the value of wealth and the availability of consumer credit.²⁵

Government expenditure, G , has since the early twentieth century and, most especially, after the Second World War, become an increasingly important component of autonomous demand in mature economies. Like the other components discussed above, public expenditure is considered autonomous because, financed by taxation revenue and public debt, it is determined independent of changes in current income and output.²⁶ However, given the activities traditionally conducted in the public sector of most mature capitalist countries, it needs to be clarified that the public spending we are referring to here excludes expenditure by public enterprises which, often being regulated government monopolies or oligopolies, operate on a commercial profit-making basis.²⁷ This means that net of any government subsidies, investment by profit-making public enterprises is treated like private investment with the distinction between autonomous and induced investment based on whether it is capacity-adjusting or has another purpose (including for the provision of social overhead capital), as discussed above in relation to

²⁴ It does not matter whether the housing so constructed is owner-occupied or rented. However, in those countries where owner-occupied housing is higher the volume of expenditure on housing tends to be higher generally because the housing demanded by a more affluent market tends to be of a higher quality and of a larger size for its location. Besides the level of income and its distribution, the extent to which the housing construction market is characterised by owner-occupied demand compared to rental housing demand will depend on a complex of other factors such as the taxation on capital assets, tenancy laws, including regulations on house rent, public housing investment, and urban planning and development.

²⁵ It may be noted that because autonomous consumption leads to debt commitments by households, changes in the level of interest rates which effect household debt-servicing of existing commitments, can have a significant impact on induced consumption by effectively reducing the amount of disposable household income available for discretionary expenditure.

²⁶ By determining the regime of tax rates and welfare payments the government has the capacity to influence its tax revenue through two different routes: (1) directly, by influencing the tax revenue as a proportion of income by determining the absolute average rate of taxation (accounting for its effects on demand and, thereby, income); and (2) indirectly, by affecting distribution and, thereby, *via* the propensity to consume, the value of our super-multiplier. Given that the capacity for government to change the tax and welfare regime in this way occurs only slowly over a long historical period, tax revenue will be largely endogenous. This means that the autonomy of government expenditure rests considerably on the capacity of the state to issue debt.

²⁷ At least since the early twentieth century, the public sectors of most capitalist countries have included profit-making public enterprises, established either by the government providing the initial start-up capital funding or through nationalization. These public enterprises have been involved in many different commercial activities. They have, for example, included commercial banks, airlines, shipping lines, oil companies, telecommunication companies, coal mining and even motor vehicle producers (e.g. the French Government's controlling interest in Renault).

autonomous investment. Hence, autonomous public expenditure is that which is independent of profit-making activities. In short, public expenditure so defined is explained by reference to government policy objectives and constraints of a social, institutional and economic shape. It is therefore conceived to contribute toward setting the pace for the growth of aggregate demand in society.

Public expenditure of course consists of both consumption and investment. As indicated above in the discussion on private investment, public investment in the provision of infrastructure can create additional productive capacity. That part of public investment devoted to the building of schools, hospitals, parks and other public works which do *not directly* contribute to productive activity can be regarded as non-capacity creating (Trezzini 1995, p. 41). But that part of public investment on infrastructure which *do directly* contribute to productive activity such as the construction of canals, dams and hydro-electrical power stations, bridges, telecommunications infrastructure, railways and designated roadways, are capacity-creating. This category of public investment supplies inputs essential to an economy's productive activity such as electrical power, water (especially to agriculture), freight transport and other communication services needed for mobilising capital and labour and for the marketing and distribution of products. In providing large-scale infrastructure of this kind, governments have historically contributed much to the development of their economies by lowering costs and opening up new markets for investment.²⁸ Hence, this kind of autonomous public investment also often creates capacity well ahead of the demand for its output and not in response to an expansion in demand generated by current income.

The final component of autonomous demand, which is relevant to a single open economy, is exports, X , financed by foreign income and explained by reference to factors

²⁸ Perhaps one of the best examples of this phenomenon is the construction of the Hoover Dam in the 1930s which subsequently transformed the economy of the south-western region of the United States. By the provision of hydro-electric power as well as water for irrigation, the Hoover Dam significantly contributed toward opening the way to an expansion in agriculture and other industries in the vanguard of the rapid post-war economic development of Southern California, Arizona and Nevada (see Stevens 1988, pp. 258-263).

which determine its foreign demand.²⁹ Exports are clearly an important source of demand for most single economies (or regions) and, especially, small-sized ones. But for the world as a whole exports are a zero-sum game and the main determining forces in the growth process are best understood within a closed (or global) economy model.

It is evident that generated by a combination of these components the growth in autonomous demand can be driven by different sources in different historical periods. Hence, appealing to history, the role of government spending was a major driver in most advanced nations during the post-war recovery phase of the second world war; whilst, in the last twenty years, autonomous consumption (as defined above) has played a more prominent role in generating demand than in previous historical periods. But having made this point, it is important to emphasize that the determination of the growth in autonomous demand as a whole will entail a causal interaction between its components and, therefore, should be part of any explanation of demand-led growth. In this respect, the sum can be greater than its parts. Hence, for example, autonomous investment in transport and communications infrastructure, financed by government spending, is likely to open up profitable opportunities for stronger growth of private investment in other fields, stronger growth in consumption and, if it entails improved productivity growth, perhaps also stronger growth of exports, thereby augmenting the overall growth in a nation's autonomous demand. But in this regard the causal relationship between these autonomous components of autonomous demand cannot be considered functional in the sense of the causal relationship supposed between income and demand, as defined by our super-multiplier. Instead, the causal relationship between them is conceived to be generally complex and contingent on a wide set of circumstances such that they could only be properly explained in concrete terms in accord with the historical approach proposed.

²⁹ If we assume that all imports, Z , are endogenous to domestic income (i.e. abstracting from exogenous imports) equilibrium income for an open economy can be expressed as:

$$Y_t = A_t / [1 - c_t - (a_t/u_t^n)g_t^e - a_t u_t^n d_t - (a_t/u_t^n - a_t/u_{t-1}^n) + z_t] \quad (28)$$

where z_t is the propensity to import and $A_t = I^A + C^A + G + X$. These modifications mean the resulting growth equation (26) would include the growth rate of exports in the growth of autonomous demand and an open economy 'super multiplier' as expressed in the second term on the right-hand side of equation (28).

6. Key Feature and Limitations of Growth Model

A key feature of demand-led growth theory in general is that labour and capital are conceived to be endogenously determined in the growth process and, therefore, at most, a shortage in their supply can only pose a temporary constraint to growth. This contrasts sharply with the traditional supply-side approach of marginalist economics in which growth is subject to the constraint of the exogenously determined supply of labour and capital for a given technique. As mentioned in the introduction, in the classical approach to the determination of prices and distribution we are adopting there is no factor price mechanism for ensuring the long-run tendency toward the full employment of labour and capital. Based on this standpoint it is supposed that normally there is unutilised labour and capital along the growth path. Indeed, in our model firms are conceived to always maintain an excess capacity for competitive purposes so that there exists in the long run as well as in the short run unutilised capacity which can be exploited to expand production. But the conception that there is unutilised labour needs some further consideration since it is not planned in any sense. While both of these inputs are conceived to be reproducible according to demand requirements, it is evident that labour can be a potential constraint to growth in a way in which capital cannot because, unlike capital, labour may not always be reproduced in the growth process at a rate that meets the production systems requirements and, *under certain circumstances*, could conceivably pose a constraint to growth. Those circumstances would be if the growth rate *globally* was above the full-employment rate, being a growth at which labour requirements exceeded the supply of labour, determined principally by the population growth rate, under conditions in which unemployment approximated to zero. However, there is no evidence to suppose that this particular set of circumstances has ever occurred at a global level in the modern history of capitalism. Moreover, the historical evidence supports the idea that globally labour supply is unlimited in the long run and only poses a temporary constraint to growth, principally caused by short-term shortages of skilled labour in fast growing regions of the global economy. In this regard, the old classical economist's tendency to assume a permanently available unutilised labour stems from their appreciation of a 'dual economy' in which modern industry could always obtain

unutilised labour from a more backward agricultural sector.³⁰ The *global economy* of modern history has and continues to be a ‘dual economy’ in which growth in advanced regions is able, through migration, to obtain unutilised labour from the less developed and backward regions (Garegnani 1990, p.116).³¹ Besides immigration, labour requirements of fast growing advanced economies can be met through increases in the participation rate and curtailed by labour-replacing technology. In all, the historical evidence shows that labour unemployment is in fact the norm in advanced economies as well as undeveloped economies in which, typically, much unutilised labour is ‘hidden’ from statistical verification. Hence, our supposition that labour supply does not constrain long-run growth is overwhelmingly supported by history. Similarly, there is little historical evidence to suppose a lack of supply of exhaustible natural resources has been a major constraint to growth over the last two centuries.³²

There are analytical limitations to our demand-led growth model which need emphasizing. In our model the *average* equilibrium growth of output and the *average* equilibrium growth in the capital stock over a period is the same although it is supposed that equilibrium output and the equilibrium capital stock at any time within a period will be systematically growing at different rates associated with variations in the utilisation of capacity. This could not otherwise be the case in a ‘growth equation’ of the form of

³⁰ This conception of the classical economists was recognized by Lewis (1954) who applied it to the study of developing economies typically characterized by a surplus of labour in the traditional agricultural sector. Of course higher productivity in the agricultural sector, though often associated with a reorganization of production and an alteration in property rights over land which may effectively force people out of farming, can enlarge the pool of unutilized labour available to modern industry. The most dramatic example today of a ‘dual economy’ is China in which the surplus of unutilised labour in the relatively backward agricultural sector has been estimated to be about 200 million persons. The migration of this huge labour surplus (called ‘floating population’) from the agricultural regions to the rapidly industrialising cities, explains why, notwithstanding growth rates of nearly 10% per annum for many years prior to 2008, the estimated unemployment rate in China’s modern industrial sector remained close to 10% (see Li, 1998, pp. 31-50).

³¹ Hence, consider the large migration, principally from Europe, to the United States which occurred in the second half of the nineteenth century to accommodate the nation’s strong economic growth. In response to the economic opportunities offered by this growth approximately 25 million persons freely migrated to the United States in the period 1850 to 1910 (Daniels 1990, p. 124).

³² This of course is in large part attributable to technological progress that has enabled the continuous discovery of new stocks of natural resources and their cost-effective extraction as well as the greater efficiency of their productive use. Hence, in the development of modern capitalism thus far the growth in the world’s recoverable reserves of exhaustible resources has exceeded the growth in their consumption. Given their finiteness, it is possible that at some future date they may become *scarce* in the true sense of its meaning, but current evidence suggests that it is a long way off with even oil, the most susceptible to depletion, likely to be available until the end of the twenty-first century.

equation (26). Our model is therefore not capable of accounting for the role of variations in the utilisation of capacity in the growth process *within any* period. Nor is it capable of accounting for interactions which occur between changes in capacity and demand along a growth path *within* a period. The complexity of these ongoing interactions in the growth process which, as discussed above in section 3, mean utilisation will be systematically different on average to normal (or desired), belongs to a separate analysis that accounts for cyclical changes in activity. Instead, our model accounts for variations between the average growth of output and capital accumulation associated with endogenous variations in average utilisation *between* different periods. It also endeavours to account for the process by which capacity adjusts to demand when the trend growth in demand deviates from that expected by firms and average utilisation systematically deviates from normal by reference to sequences of periods in which the trend growth rate changes from one period to the next. In this rather mechanical way the model represents interactions between demand and capacity along a path of changing *trend* rates of growth and accumulation.

Notwithstanding these limitations, our model does provide an analytical framework of the fundamental Keynesian notion that the growth in output and capital accumulation is wholly determined by the growth in aggregate demand. It shows that economic growth is determined by the growth of autonomous demand and by changes in the value of the super-multiplier. Hence, from the standpoint of demand-led theory, the growth and development of capitalist economies is to be explained by reference to those key factors which are seen to determine the growth of autonomous demand and the value of the super-multiplier, among which would include income distribution and technological progress. Our model also provides an account of how capacity endogenously adjusts to demand consistent with a process by which average utilisation tends toward normal utilisation of capacity over a long period of time but remains systematically different from it. In this way the model does articulate the dynamic interaction between long-run changes in capacity and demand along a path in which the trend rate of growth can change. Recall that the main purpose of the model is to provide the theoretical framework for a more *concrete* analysis of economic growth and development over epochs. In this

connection, the model aims to provide an historical perspective on analysing economic growth by reference to sequences of epochs in which a concrete explanation of growth performance in one epoch entails an account of the economic history of previous epochs.³³

7. Technical Progress and Growth

Since Adam Smith's *Wealth of Nations* (1776) technical progress that induces sustained growth in productivity has been commonly identified as the single most important force in explaining the unprecedented historic growth and economic development experienced over the last two-hundred-and-fifty years by the advanced industrialised nations of today.³⁴ Certainly, technical progress, by overcoming potential supply constraints, chiefly posed by nature, has historically opened the way to economic development. Indeed, it is difficult to imagine of the industrial revolution occurring in the nineteenth century without the energy afforded by the technology of coal-fuelled steam power and, then, in the twentieth century and onwards, by coal-burning electrical power and, for energy in transport, by the petroleum-fuelled internal combustion engine. By so eliminating potential supply constraints to long run adjustment of output to demand, technical innovation can be viewed from the standpoint of demand-led theory as *facilitating* the forces of demand to more freely drive growth. But from this standpoint it is not altogether obvious how technical progress plays a leading role in contributing to the growth in demand that actually drives economic growth.

³³ This historical approach to explaining growth and economic development is evident in the contributions of major post-war development economists such as Kuznets (1965), Rostow (1961), Hirschman (1958) and the historian, Gershenkron (1962). The only difference with the historical approach suggested here is that it is informed by a Keynesian demand-led theory of growth, as proposed in our model. More recently, explanations of growth employing an historical approach from a Keynesian perspective have been provided by Cornwall (1977; 2001).

³⁴ See, for example, Landes (1969, esp. pp. 1-12), Gershenkron (1962, pp. 5-71), Mokyr (1985, p. 9), Leibenstein (1963), Marshall ([1920] 1961, Vol. 1, Chs. VIII to XIII and, esp. pp. 314-320), Schumpeter ([1934] 1961, pp. 57-95; 1939, I, esp. pp. 84-86) and Solow, R.M. ([1987] 1992).

In consideration of the contribution of technical progress in promoting demand-led growth let us be clear that we are concerned with a closed (or global) economic system. It can be plausibly argued that technical progress of a single open economy (or region of a country) can, by improving its international competitiveness, both in terms of reducing relative cost and producing better quality products, directly generate export demand and, thereby, augment its national (regional) income. But this expansion in foreign demand for a single country's (or region's) output could well come at the expense of other country's (region's) demand and output rather than contributing to an expansion in global demand and global income.³⁵ Hence, the fundamental question is how does technical progress contribute to the growth in aggregate demand in a closed system?

In the first place, technical progress tends to be labour saving thereby reducing employment per unit of output. Second, to the extent technical progress reduces the capital-output ratio, it also tends to reduce capacity-generating investment per unit of output.³⁶ In our view this means that technical progress must induce productivity growth which, by augmenting aggregate real income, contributes to the expansion in demand by an extent that well outweighs the negative effects on demand of the input-saving process. The key appears to be the extent to which technical progress is able to promote the expansion in consumption. In this connection most important to the income-augmenting process is that productivity growth operates to progressively cheapen the price of consumption goods *in relation to* money income, thereby augmenting the purchasing power of the market and enabling an expansion in consumption.³⁷ There are various possible ways in which this process operates, which are connected to how income is

³⁵ In consideration of the role of technical progress within his analysis of 'cumulative causation' Kaldor ([1966] 1978; [1972] 1978) was diverted from this question by his focus on its application to the growth of a single economy. This was because he was primarily concerned with finding policy solutions to the post-war problems of the United Kingdom economy.

³⁶ In our model the progressive adoption of a superior technique from one period to the next can be represented by $a_t < a_{t-1} < a_{t-2} \dots < a_{t-n}$.

³⁷ This 'cheapening' of consumer products does not just consist of lowering the real price of products of a given quality, but through innovation, improving the quality of products so as to lower the real price of the services they afford the consumer. Thus, for example, improvements in the design of motor vehicles enable consumers to get more mileage per unit of fuel and therefore attain the travel services they offer more cheaply; while innovation in information technology electronics has progressively improved the functional capacity of personal computers such as to considerably cheapen the information and communication services they provide to consumers.

distributed. For a given normal rate of profit, the process can entail a lowering in prices of consumption goods in relation to *given* money wages, implying lower price inflation or, alternatively, it can entail a negotiated increase in money wages to capture productivity gains for labour, implying higher price inflation. In fact the process is usually likely to entail a combination of both money price reductions and money wage increases in a closed system. However, if the normal rate of profit increases then the productivity gains will tend to be distributed more in favour of profits and if the normal profit rate declines it will oppositely tend to favour the wage share. The taxation and welfare system will also influence how the productivity gains are distributed. In all plausibility the process by which productivity-induced gains in real income leads to an expansion in consumption involves a 'widening of the market' in the sense that there is a progressive enlargement in the number of consumers who can enjoy higher consumption per head, implying a sharing of the gains in social income to the wider population.³⁸ Arguably, the most favourable effect will occur when there is a more equal distribution of the productivity gains to income and, indeed, any significant augmentation of consumption may depend on some minimal distribution of these gains.

By the augmentation of consumption, productivity growth will, derivatively, induce an increase in capacity-generating investment. Technical innovation will also tend to augment autonomous investment. In the first place, innovation which raises the productivity of capital equipment will generally induce increased investment as firms more frequently replace 'obsolete' capital equipment to maintain their competitiveness. Secondly, associated with improving the quality of consumer products as well as developing new ones, technical innovation will induce investment with the purpose of altering and/or developing new processes of production. In this connection, innovative changes to consumer products and the technical development of more productive capital equipment requires investment in the means of producing them such that more continuous changes in the structure of demand will tend to induce greater investment to

³⁸ Technical innovation is much motivated by competition over market share, with firm's endeavouring to offer cheaper products and/or better quality products that supersede existing ones to capture a larger market by which they can exploit increasing returns to scale. This competitive process thereby plays an important role in widening the market so understood.

adjust the structure of productive capacity.³⁹ This process of structural change in which an ever wider array of products is consumed associated with the greater consumption of new innovative products will necessitate an expansion in total consumption made possible by the productivity gains of technical progress augmenting real income. But since total consumption will be predominantly determined on the basis of income generated by sources of demand *other than* technical progress, the latter itself will depend much on the growth in aggregate demand. This circular causation between technical progress and aggregate demand underlies the complex and contiguous nature of the manner in which technical progress is conceived to promote economic growth in a demand-led approach.⁴⁰

Notwithstanding the complexity of the causal process, we can re-write growth equation (26) to provide a simple representation of how technical progress contributes to demand-led growth:

$$g_t^y = g_t^A (1 + \alpha_t) + \Delta m_t (A_t/A_{t-1}) \quad (30)$$

where α_t is the propensity of demand growth stemming from the effect of productivity gains on income growth, expressed as a proportion of the growth in autonomous demand. In this representation α_t is assumed determined on the following basis:

$$\alpha_t = \lambda_t \nu_t \quad (31)$$

where λ_t is the *ratio* between the productivity gain in income generated by technical progress, δ_t , and the growth in autonomous demand:

$$\lambda_t = \delta_t / g_t^A \quad (32)$$

³⁹ On the complexities of the connection between technical innovations which, in a competitive sense, shorten the life of equipment and products, and effective demand, see Caminati (1986); and on the broadening of consumption across a larger composition of new innovative consumer products, see Gualerzi (2001).

⁴⁰ The complexity of this circular relationship is best understood in terms of the conception of ‘cumulative causation’, as largely proposed by Kaldor ([1970] 1978; [1972] 1978). On this conception and its origins, see Toner (1999).

and where v_t is the propensity to spend (i.e. $v_t = [c_t + (a/u_t^n)g_t^e + a_t u_t^n d_t + (a/u_t^n - a_t/u_{t-1}^n)]$).

In the relationships proposed in these equations it is possible to identify a circular causality running from demand growth to technical progress back to demand growth. First, the productivity gain generated by technical progress can be considered to be in some measure endogenous to g_t^A to the extent that autonomous demand consists of investment connected with innovation, in particular, investment in education, knowledge-creation in the sciences and in innovation which creates new more productive processes of production as well as investment that through competition brings about the diffusion of superior technology in the economic system. Hence, it can be argued that the value of the ratio λ_t will tend to be higher the larger is the growth of these kinds of innovative-generating investment. This, in turn, will depend on a complex set of longstanding factors such as laws on patents and intellectual property rights, market regulations affecting entrepreneurship and the role of innovation in competition as well as government policies on trade, education and technology enhancement, all of which influence investment in the creation and diffusion of superior methods of production that generates productivity growth. Second, the contribution to growth of the productivity gain of technological progress, achieved by reducing prices *in relation to* money incomes, the latter mainly consisting of money wages, depends on its contribution to the growth in demand according to the propensity to spend, v_t . Underlying the importance of consumption in this process, the propensity to consume, c_t , being normally the largest, is the most important variable in determining the propensity to spend.

In this simple conception $(1+\alpha_t)$ can be considered a ‘technological growth multiplier’, representing the multiple increase in income (output) growth attributable to the additional technically-induced expenditure which accompanies, and in part, is endogenous to, the growth of autonomous demand, in the manner indicated above.⁴¹ By contrast to this

⁴¹ To illustrate this conception let us suppose that on average over period t the growth in autonomous demand, g_t^A , is 2%, the productivity gain in income generated by technical innovation, δ_t , is 1%, and the value of the propensity to spend, v_t , is 0.8. This would mean the ratio λ_t is equal to 0.5 and the propensity

augmenting effect on the growth of demand, technical progress will, given distribution, tend to induce a negative change in the value of the super-multiplier, Δm_t , chiefly through the effect of a lower capital-output ratio, a_t , on the propensity to invest, I_t^I .⁴² Therefore, providing the augmenting effect on the growth of demand of technical progress (i.e. $g_t^A (1+\alpha_t)$) outweighs any negative effects on the super-multiplier (*ceteris paribus*, moderated by a higher value of A_t/A_{t-1}), it will contribute to higher demand-led economic growth. However difficult it may be to precisely calculate the parameters quantitatively, what our conception does clearly show is that the effect of technical progress on demand-led growth is contingent on a set of other factors affecting demand. Hence, it is evident that even with high productivity gains (and, therefore, a high value of δ_t and of α_t) resulting from technical progress the growth rate could well be zero or negative because the growth rate of other contributing sources of demand are altogether negative. It is also evident that even in absence of any income-augmenting productivity gains of technical progress (i.e. $\delta_t = 0$, $\alpha_t = 0$), economic growth can be healthy due to other more dominant forces ensuring strong aggregate demand. In this case, though, output per person is likely to remain unchanged so that growth will create labour employment without much impact on average living standards.

8. Conclusion

This paper has been concerned with providing an analytical framework to explain trend growth consistent with demand-led theory. The consideration we gave in sections 4, 5 and 7 above to the various factors which explain the growth in autonomous demand, the value of the ‘super-multiplier’ and the role of technical progress in promoting growth has shown that from the standpoint of our demand-led growth theory there is a complex of social, politico-institutional and technological forces which explain the growth and development of economic systems. As particularly well shown in section 7, the

of demand growth, α_t , is equal to 0.4 (i.e. $\alpha_t = \lambda_t v_t = (0.5) (0.8)$). The technological growth multiplier, $(1+\alpha_t)$, would therefore equal 1.4 so that $g_t^A (1+\alpha_t)$ is 2.8% (i.e. .028).

⁴² The depreciation rate, d_t , is also likely to decline with the greater adoption of newer improved quality capital equipment which reduces the average age of the capital stock.

complexity connected just with the role of technical progress in the demand-led growth process clearly shows that an explanation of growth, which must account for structural changes in the economic system, is so complex that it can only be satisfactorily achieved by concrete analysis that entails, by definition, an historical approach. The binding principle of our demand-led framework to any historical-based analysis of growth is that these forces explain growth by reference to their causal role in the determination of the growth in aggregate demand.

A theoretical issue that arises in the framework we are employing is the compatibility between our demand-led growth theory and the classical ‘surplus’ approach to the determination of prices and distribution, outlined in the introduction of the paper. This issue arises because as proposed in sections 3 and 4 above average utilisation of capacity systematically deviates from normal utilisation in our demand-led growth model notwithstanding that the deviation itself sets in motion the tendency of long run adjustment of capacity to demand. In the classical approach to prices and distribution normal utilisation corresponds with the normal price around which actual prices gravitate according to competitive forces which operate to establish a uniform rate of profit on employed capital in long period equilibrium. The normal utilisation of capacity that underlies normal price is best defined as the long-run average utilisation which is *planned* when new fixed capacity is installed based on the *expected range* of demand for products to be accommodated by output. It is that utilisation which, for a given technology, is calculated to minimize the normal cost of production consistent with a capacity to produce a range of output levels to accommodate expected fluctuations in demand with the expected peak level of demand accommodated around full capacity utilisation (Ciccone 1986, pp. 26-32). Our conception of normal utilisation supposes that in determining the corresponding normal cost of production firms in general account for a considerable range of variations in the utilisation of their capacity.⁴³ As Ciccone (1986,

⁴³ As Clifton (1983, pp. 25-29) shows, this conception is supported by evidence of the institutionalised system of ‘administered prices’, whereby firm’s set a ‘base price’ calculated on the basis of the expected average cost of production and which is expected to earn the highest attainable rate of return on installed capital *consistent with* producing a range of output that accommodates all demand for the product over a period which accounts for the cycle of fluctuations in demand. The ‘base price’ corresponds to a ‘standard volume’, which is essentially the expected average level of output. However, what is important to our

pp. 23-26) has shown, on this conceptual basis the gravitation of prices to their normal values does not require capacity in the whole system of production to have fully-adjusted to demand so that long run average utilisation conforms to normal utilisation. While the tendency for capacity to adjust to demand in the establishment of normal utilisation, which is constantly at work, contributes to the gravitation process the achievement of full adjustment is not necessary to the establishment of long period normal prices. Hence, the divergence between long-run average utilisation and normal utilisation of capacity, which characterises this tendency in our growth model, is compatible with the gravitation of prices to their normal values along the growth path.

To conclude, we briefly consider macroeconomic policy, which according to our demand-led theory is conceived to play a primary role in determining the growth and economic development of the modern state. In contrast to the traditional position both fiscal policy and monetary policy are conceived to exert a lasting influence on economic growth through their capacity to exert a lasting influence on the growth in aggregate demand. Firstly, with respect to fiscal policy, in our growth model the long run elasticity of output associated with changes in utilisation as well as capacity mean that government spending, as an important component of autonomous demand, can globally generate its own saving in the long run as well as in the short run. Hence, ‘crowding out’, as traditionally conceived of in marginalist economics, is simply not applicable.⁴⁴ On the contrary, when consideration is given to the relationship between autonomous components of demand, government spending, especially on public infrastructure, is

conception is that the ‘base price’ is determined on the basis of two important considerations. Firstly, it takes account of the expected variation in costs associated with variations in volume around the standard volume that would correspond to expected variations in actual utilisation around normal utilisation. Secondly, it accounts for the contingency that average utilisation turns out to be actually higher than normal utilisation (i.e. average volume is higher than standard volume) because of higher average demand than expected which may stem either from a greater expansion in *market* demand than expected or from capturing a greater *share* of market demand at the expense of rivals. In this regard one of the major purposes for firms holding spare capacity is to exploit opportunities to expand sales revenue, which in most circumstances is likely to deliver windfall profits. Even if circumstances connected with pressures on capacity utilisation induce higher costs that reduce the actual rate of return, for competitive purposes firms will want to expand their attainable output, especially if it is associated with an increase in their market share, with the knowledge that they can in the future adjust their capacity to a permanently higher demand.

⁴⁴ Fundamentally, the ‘crowding-out’ argument is based on the marginalist notion that factor prices operate in the long run to adjust the economic system to a position of full employment (consistent with an arbitrarily imposed supply-side constrained natural rate of unemployment).

likely to have a ‘crowding in’ effect by stimulating, or at least assist facilitating, private autonomous investment and, in turn, autonomous consumption.⁴⁵ This does not mean that the growth of public-debt financed government spending can occur without constraint. The essential constraint on the size of public debt and its growth is the capacity of the government over time to service the debt out of its recurrent revenue and, therefore, at the expense of otherwise alternative recurrent expenditures, consistent with meeting its social and economic obligations and its political objectives.⁴⁶ Secondly, with respect to monetary policy, in contrast to the orthodox position, it can be conceived to exert a *permanent* influence on growth in our analytical framework. This stems from the classical ‘surplus’ approach to distribution we have adopted. In this approach the most plausible way of determining distribution is to treat the normal rate of profit as independently *given*, on the basis that it is systematically regulated by the long-run average money rate of interest, so that the real wage is residually determined along with normal prices for a given technique of production (Sraffa 1960, p. 33; Pivetti 1990, pp. 10-32; Smith 2006, pp. 21-24). It can then be logically sustained that monetary forces in the financial system, most especially monetary policy, that determines the long-run average money rate of interest, and, thereby, causally, the normal rate of profit, can exert a lasting influence on economic activity, chiefly through its lasting effect on income distribution.⁴⁷ Accordingly, the longstanding interest-rate policy of the monetary authorities is conceived to influence economic growth by influencing the growth of aggregate demand, primarily through its effect on the growth in consumption and its effect on the long running stance of fiscal policy (see Smith 2006, pp. 26-29).

⁴⁵ When account is taken of this augmenting effect on other components of autonomous demand so understood in section 5 the overall multiplier effect on income will be larger than that traditionally measured by the quantitative increase in endogenous demand (given by the super-multiplier) only associated directly with the government spending on capital infrastructure. In this way of thinking the overall ‘multiplier’ effect on income, calculated over a long period of time, would be based on the effect of the total increase in autonomous demand consequent upon the government spending on infrastructure.

⁴⁶ Given that government taxation revenue is by and large a long run function of national income and that the public debt-servicing cost is determined by the nominal rate of interest, then the nature of the constraint revolves around the key relationship between the growth rate and the interest rate. For an eloquent account of the basic constraint on government budget deficit financing, see Passinetti (1997).

⁴⁷ This notion that the interest rate is determined purely by monetary forces and that interest-rate policy has a lasting influence on activity through demand was essentially adopted by Keynes in the *General Theory* (1936) and after (see Panico 1988, pp. 102-180; Pivetti 1991, pp. 8-10).

From the standpoint of our demand-led approach policy-making institutions play a critical role in the determination of growth and economic development. Any plausible explanation of growth would need to account not only of long standing fiscal policy of government and the interest-rate policy of central banks, but of government trade and industry policies, market regulations and policies relating to property rights, all by reference to their objectives and the constraints on policymakers. An appreciation of the role of institutions, not just policymaking ones, in the growth process, will itself entail an understanding of their history. This underscores our essential argument that to properly explain the demand-led process of growth an historical approach is necessary.

Appendix

The incorporation of autonomous demand which is capacity-creating poses no serious difficulty for our demand-led growth model expounded in section 3. The main effect is on the determination of the capital stock and, thereby, on the average utilisation of capacity. If we denote capacity-creating public investment as G_C and capacity-creating autonomous investment as I^A_C , then the determination of the capital stock in periods t and $t+1$ is expressed by replacing equation (20) with:

$$K_t = K_{t-1} + G_{Ct-1} + I^A_{Ct-1} + I^I_{t-1} + (u^n - u^a_{t-1}) ad_{t-1} Y_{t-1}$$

$$K_{t+1} = K_t + G_{Ct} + I^A_{Ct} + I^I_t + (u^n - u^a_t) ad_t Y_t \dots \quad (29)$$

Other than through its impact on demand, our two components of capacity-creating autonomous demand have no bearing on investment decisions concerned with adjusting capacity to demand. Induced investment, I^I , as defined precisely in section 3 above, remains determined according to equation (15). According to our model, capacity-creating autonomous investment (both public and private) will only impact on *future* induced investment by changing the relationship between average and normal utilisation. Hence, for example, with reference to equation (29), capacity-creating autonomous

demand in period $t-1$ (i.e. $G_{C,t-1}$ and $I^A_{C,t-1}$) will contribute to the level of the capital stock available for use in period t (i.e. K_t) upon which induced investment is based and average utilisation is determined in period t . Any resulting change in the difference between average utilisation so determined in period t and normal utilisation will then influence induced investment in period $t+1$. However, this avenue of influence will depend not only on how capacity-creating autonomous demand affects average utilisation (in period t) but how it also affects normal utilisation (in period $t+1$). On the one hand, given that the additional capacity created by this kind of autonomous investment will be ahead of its demand so that for a long time after installation there will be considerable unused capacity, should its average growth rate rise sharply as a result of a bunching of infrastructure construction, average utilisation of capacity for the economy as a whole will tend to decline. On the other hand this capacity-creating investment is likely to be associated with a lowering of normal utilisation consistent with the rate at which the additional spare capacity installed is expected to be utilised over time into the future according to the expected rate of growth of demand. Thus, consider the construction of a dam with a hydro-electrical plant. It will take a long time, perhaps up to thirty years after considerable economic development, before the demand for electrical power is expected to reach a rate at which utilisation of the hydro-electrical plant approaches anywhere near its full capacity. By reference to the employment of material (or variable) inputs and cost-minimisation, the normal rate of utilisation on such an investment project will be on an ascending path over the time period in which full-utilisation is expected to be gradually approached. It is evident that with such excess capacity there will be no induced investment connected with the production of electrical power (in the relevant region of its market) over this long period of time. As discussed in section 4 above, normal utilisation is conceived to be changed in each period as firms revise their plans on the basis of past experience and expectations of future demand growth.

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