

Innovation, Unemployment and Policy in the
Theories of Growth and Distribution

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Introduction

Renato Balducci and Neri Salvadori

The problem of economic growth and income distribution was a major concern of the Classical economists. Ricardo's argument about what he called the 'natural' course of the economy contemplated an economic system in which capital accumulates, the population grows, but there is no technical progress: the latter is set aside. In Ricardo the rate of accumulation is endogenously determined. The demand for labour is governed by the pace at which capital accumulates, whereas the long-term supply of labour is regulated by the 'Malthusian Law of Population'. The required size of the work force is considered essentially generated by the accumulation process itself. In other words, labour power is treated as a kind of producible commodity. It differs from other commodities in that it is not produced in a capitalistic way by a special industry on a par with other industries, but is the result of the interplay between the generative behaviour of the working population and socio-economic conditions. In the most simple conceptualization possible, labour power is seen to be in elastic supply at a given real wage rate basket. Increasing the number of baskets available in the support of workers involves a proportional increase in the work force. In this view the rate of growth of labour supply adjusts to any given rate of growth of labour demand without necessitating a variation in the real wage rate. Labour can thus set no limit to growth because it is 'generated' within the growth process. The only limit to growth can come from other non-accumulable factors of production: as Ricardo and others made clear, these factors are natural resources in general and land in particular. In other words, there is only endogenous growth in Ricardo. This growth is bound to lose momentum as the scarcity of natural factors of production makes itself felt in terms of extensive and intensive diminishing returns. (Technical change is of course envisaged to counteract these tendencies.) If land of the best quality were available in abundance it would be a free good and no rent would be paid for its use. In this case the system could grow for ever. Ricardo was perfectly aware of this implication (Ricardo, *Works* VI, p. 301). Contrary to Ricardo, Adam Smith's attention focused on the factors determining the growth of labour productivity, that is, the factors affecting 'the state of the

skill, dexterity, and judgment with which labour is applied in any nation' (WN I.6). Smith maintained that the key to the growth of labour productivity is the division of labour which in turn depends on the extent of the market and thus upon capital accumulation. In his analysis in the first three chapters of book I of *The Wealth of Nations* Smith established the idea that there are *increasing returns*. Smith's analysis foreshadows the concepts of *induced* and *embodied* technical progress, *learning by doing*, and *learning by using*. The invention of new machines and the improvement of known ones is said to be originally due to the workers in the production process and 'those who had occasion to use the machines' (WN I.i.9). At a more advanced stage of society making machines 'became the business of a peculiar trade', engaging 'philosophers or men of speculation, whose trade it is, not to do any thing, but to observe every thing; and who, upon that account, are often capable of combining together the powers of the most distant and dissimilar objects'. Research and development of new industrial designs becomes 'the principal or sole trade and occupation of a particular class of citizens' (ibid.). New technical knowledge is systematically created and economically used, with the sciences becoming more and more involved in that process. The accumulation of capital propels this process forward, opens up new markets and enlarges existing ones, increases effectual demand and is thus the main force behind economic and social development (WN V.i.e.26). Also Smith saw that the scarcity and potential depletion of renewable and the depletion of exhaustible resources may constrain human productive activity and the growth of the economy (WN I.xi.i.3; see also I.xi.d). However his explanation of a falling tendency of the rate of profit in terms of 'competition' (WN I.ix.2) does not stand up to close examination.

Neoclassical economists were more interested in the analysis of resource allocation than problems of growth, which was not a main issue on the agenda of economists for half a century. Things changed dramatically after Roy Harrod (1939) tried to re-formulate Keynes's theory of effective demand in a dynamic context. The analysis of steady growth proposed by Harrod (1939) and by Domar (1946) took centre stage in the second half of the 1950s, when Tobin (1955), Solow (1956) and Swan (1956), on the one hand, and Kaldor (1955–56), on the other, presented their versions of the neoclassical and post-Keynesian theories of growth and distribution. Harrod set the conditions that a growing economy needs to satisfy in order to grow in equilibrium and doubted that such conditions could be fulfilled by the actions of agents. Solow provided an endogenous explanation for the condition necessary to ensure Harrod's condition. He postulated a well-behaved aggregate production function satisfying the Inada conditions and showed that there can exist a combination of the capital and labour factors which fulfils the condition of balanced growth with full employment.

Moreover, there exist values of both real wage and profit rate such that 'optimal' technology will be selected by perfectly competitive firms. In the Neoclassical approach developed by Solow capital accumulation sustained by adequate saving is relevant during the transition to steady state whereas the increase in the working-age population and the technical progress which increases the productivity of the production factors determine the steady state growth path but are considered to be beyond the control of private agents and governments. Whatever the values of the propensity to save and of capital output ratio, and therefore whatever the path of the economy out of equilibrium, the natural rate of steady state growth is not influenced by such magnitudes, for the simple reason that it is assumed to be exogenous: 'But of course Solow did not believe this to be so in reality. ... Rather, economists were reluctant to give formal expression to unknown and ill-understood processes such as population growth and the rate of innovation' (Hahn, 1994, p. 2).¹

After a decade of dormancy, since the mid 1980s, economic growth has become once again a central topic in economic theorizing. New growth theory² seeks to provide an endogenous explanation of technical progress able to generate a growth process which does not slow down in time. New growth theorists account for a non-diminishing rate of per capita growth considering externalities of various kinds and origins. Adopting the scheme of rational and optimizing agents, they draw on notions like Arrow's learning by doing, or the importance of human capital accumulation stressed by Uzawa (1965) and that of technical knowledge, to provide an explanation of *technical progress*. As partly public and non-excludable, these 'commodities' (for example, human capital and the stock of 'knowledge'³, etc.) may generate externalities in the production process tied to the spread of knowledge and scientific discoveries. Firms which undertake research cannot immediately reap the economic results of their efforts because of the diffusion of innovative ideas, the consequence being that private investment in research may be less than optimal for growth. Agents may behave in optimizing fashion, but because they operate in a setting which is not perfectly competitive, they engender a second-best growth path.

Most of these models are 'closed' in the sense that they have enough relations to determine an equilibrium growth rate. In one, everything hinges on the production of human capital, in another this is ignored and we focus on R&D, while in yet another it is the process by which the variety of goods is increased which makes the world go round. ... The theories I am concerned with, ..., are all intent on models which allow equilibrium growth at constant rate (Hahn, 1994, p. 1).

The closeness of these models mentioned by Hahn is the basis of the link envisaged by Kurz and Salvadori (1998, 1999, 2003) between these models

and the models developed by Classical economists. By a simple comparison Kurz and Salvadori draw the following conclusion: the role played by 'labour' in the classical authors is assumed by 'human capital' or 'knowledge'. Both labour, on the one hand, and human capital or knowledge, on the other, are taken to be producible; with constant returns to scale the rate of profit and, therefore, the rate of growth are determined and constant over time. The use of externalities allows the presence of increasing returns similarly to the division of labour found in Adam Smith's reasoning. In another book (Salvadori, 2003) some of the authors of the chapters presented herein explored this point of view from different perspectives.

The aim of this book is different. Taking for granted the not always recognized links between new growth theory and Classical economics the authors of this book seek to go further and develop an analysis of the relation between growth and distribution, with special attention to innovation, unemployment, and policy. Hence, before entering into a description of the chapters presented here we will quickly survey parts of the literature which are relevant to the following studies.

ENDOGENOUS GROWTH AND INCOME DISTRIBUTION

Within the revolution produced by endogenous growth theory, possible interactions between growth and distribution are resumed by shifting the attention from functional to personal income distribution. Persson and Tabellini (1992) argued that there exists a negative correlation between inequality and growth, and they sought a theoretical explanation for it in an overlapping generations model of economic and political equilibrium. Their thesis was that, when inequality exceeds a socially acceptable threshold, it requires redistribution policies financed by an increase in taxation which disincentives investments and slows down growth. Moreover, excessive inequality undermines the social structure, generating political conflicts, uncertainty over the defence of property rights, and an environment unfavourable to investments. Bertola (1990, 1993, 1994) calls into question the ability of redistributive policies to slow down growth. Investment subsidies, by closing the gap between the private return and the social return on investments in intangible goods (education and research), may increase the rate of growth. Alesina and Rodrik (1994) propose a model of endogenous growth in which conflicts between labour and capital play a key role. This conflict determines income redistribution policies and influences the economy's growth rate: the more unequal the distribution of wealth, the lower is growth rate. This model shows that it is possible to establish relations between growth and distribution in endogenous growth theories,

especially if these relations are mediated by the government (see Section 4 below). This conclusion contrasts with the traditional neoclassical model, where the distribution of income has no influence on the economy's rate of growth, while it reproduces the relation between income distribution and growth rate proposed in the post-Keynesian and Kaldorian tradition. However, in this last tradition the main result was that a higher growth rate is associated to a greater share of profits to income, from which it is possible to extract a higher percentage of saving and investment.

In conclusion, endogenous growth models show that structural, political and institutional characteristics of countries play a role in explaining the long-period growth rate. Political and social stability, security of property rights, efficiency of the capital market, research, education, investments in physical and human capital, public spending and taxation policies are decisive for the success and stability of a country's development process.

So even when we accept the relation of saving to an economy's growth which I have discussed,⁴ the distribution of wealth and income may be expected to play a role also. ... In any case the distribution of feasible action sets between agents is likely to be pretty relevant to growth (Hahn, 1994, p. 14).

UNEMPLOYMENT, DISTRIBUTION AND GROWTH

During the 1990s two stylized facts attracted the attention of economic policy-makers and economists: persistently high or growing rates of unemployment, and a decrease in the wage share. An explanation for these 'stylized facts' cannot be found in the traditional neoclassical theory, for which employment is determined by the labour demand and supply and should not depend on the capital accumulation and on technology. This is because real wage ensures that the labour supply is always entirely absorbed, while capital and technology determine the real wage compatible with full employment and the distribution of income between wages and profits. Instead, recent theories of endogenous growth supply explanations of the relation between growth and employment which also involve the distribution of income among the production factors. These explanations take account of frictions either in labour markets, or in the goods markets, or in the financial markets, or in a combination of them. Further, they need to assume either limited substitutability between labour and capital, or complementarity between technology and human capital, and so on.

Recent analysis seems to confirm that a more rapid growth of technical progress may have a negative influence on employment in the short period. The effect of creative destruction *à la* Aghion and Howitt (1992, 1994) (that

is skills become obsolete since they are replaced by new, more productive occupations) seemingly predominates over the positive effect of greater capital accumulation. In the long period, however, technical progress innovates products and processes and increases employment both directly and indirectly as a consequence of the more rapid growth. But the long-run effect of capital accumulation on the equilibrium unemployment rate is still widely debated. According to some authors (Layard, Nickel and Jackman, 1991; Nickel, 1997), it cannot be ruled out that investment is neutral in terms of employment, because job creation when the investment is made may be counterbalanced by the ‘destruction’ of jobs caused by the successive increase in real wages. This should be the case in a trade union model, provided that the production technology is a Cobb–Douglas type and unemployment benefit is a constant ratio to wages. Consequently, it is the high degree of factor substitutability that is responsible for the substantial independence of the unemployment rate from capital accumulation. Rowthorn (1996) explicitly considers conflict for distributive shares, which he calls the ‘*battle of mark-ups*’, to put forward a different thesis. An increase in the capital stock gives rise to an excess of productive capacity which makes it difficult for firms to increase their prices. The distributive conflict consequently attenuates, and a stable inflation rate can be combined with a lower rate of unemployment. Gordon (1997) argues that the steeper the fall in the investment rate, the greater the growth of the unemployment rate. A shock to the real wage, due for example to increased trade-union bargaining power, will initially give rise to a decline in employment and to an increase in labour productivity. By contrast, the marginal productivity of capital will diminish, because a given stock of capital is now combined with a smaller number of labour units. This should reduce the demand for new capital and shifts the labour demand downwards. If the production function is of Cobb–Douglas type, in the new equilibrium there will be the same marginal productivity of labour, but less employment, so that the traditional positive relation between productivity and unemployment is reversed.

Recent literature⁵ has emphasized the skilled-biased nature of technology change and the existence of complementarities between technology and human capital. These complementarities increase demand for skilled workers and their remuneration at the expense of unskilled ones, and they may give rise to distributive effects and a widening of wage gaps. But explaining the relation between unemployment and growth, and assessing the role of income distribution in that relation, is almost impossible within the neoclassical framework. Even if one includes ‘imperfections’ in the labour market, it is not possible to establish a stable relation between growth and unemployment. Vice versa, it is possible to ‘construct’ relations between distribution and growth by resorting to the classical tradition, in particular to

Ricardo; or by returning to the post-Keynesian tradition, with its emphasis of the effect on income distribution on saving and hence on growth and unemployment.

These models (Boyer, 1988, 1997) resume many of the themes treated within the Classical and the post-Keynesian traditions, although to explain relations between growth and distribution requires reference to imperfections of the labour market or to institutional characteristics. These interactions are acted upon by the social system: influential in particular are the structure of trade-union relations and property rights, and the evolution of consumption patterns and education. Economic systems, in short, are characterized by their own cumulative dynamics. They may break with the previous 'mode of growth' and shift to a new equilibrium with different levels in the growth rate, in the unemployment rate, and in the composition of demand.

LABOUR UNIONS, WAGE INEQUALITY AND GROWTH

Since its beginnings, endogenous growth theory is concerned about the relation between growth and the unequal distribution of wealth. It explores the effects of the distribution of resources on the activity of the research and development sector R&D. The model developed by Aghion and Howitt (1998) considers a three-sector economy where the final sector, which operates in conditions of perfect competition and constant returns to scale, produces both consumption goods and an input utilizable in the R&D sector; while monopolistic competition and increasing returns characterize the intermediate goods sector, in which short-period surplus profits create the incentive to introduce new inputs. Blueprints for new intermediate products are developed in the R&D sector by new intermediate firms. Each firm produces a new input, so that the growth rate is defined by the rate of new firms formation. The use of labour is examined in a competitive setting where it is employed to produce intermediate goods. The population is divided between workers and owners – that is, agents with a low level of spending and high saving (which can be invested only in new firms creation). In this context, Aghion and Howitt show that an unequal distribution of wealth may be favourable to growth. In fact, although the owners have high spending capacity, they are able to save a greater percentage of their incomes than workers. This saving fosters the accumulation of capital and more rapid growth through the creation of new firms which innovate in the R&D sector. Onto this analytical structure can be grafted Schumpeter's notion of the creative destruction that sustains endogenous growth through the introduction of new products which replace already existing ones and thus engender qualitative improvements. The

engine of growth arises from the allocation of the labour resource between the traditional and the innovative sectors.

Introducing imperfections into the labour market may give rise to a trade-off between the short-period advantages of a fairer distribution of incomes and the long-period cost of less sustained growth. Duranton (2000) proposes an overlapping generations model where capital accumulation is the engine of growth. Increasing returns to scale generate imperfect competition and stimulate growth, creating incentives for monopolists to invest in the R&D sector, and for younger workers to invest in knowledge in order to increase their productivity and their earnings. Moreover, because young people have greater incentives to save than elderly workers, a redistribution of wealth in favour of young people fosters saving and growth through the creation of new firms in the intermediate goods sector.

These considerations on the labour market lead naturally to inquire as to the role of the trade unions. Wapler (2001) presents a model based on Schumpeterian creative destruction with endogenous technical progress and heterogeneous workers. The trade unions represent only low-skilled workers and they define the pay of these workers on the basis of 'fair wage' considerations. The economy produces two goods, one final and the other intermediate, the latter being constantly improved and innovated by the R&D sector. The first result is that an increase in the supply of skills or in human capital accumulation leads to a more rapid growth rate, reducing the cost of research via a fall in the wages of researchers. The second result concerns the effects of trade-union power on growth. Higher real wages of low-skilled workers cause the unemployment of these workers, who tend to move to the research sector. This reduces the productivity of skilled workers in the creation of innovations and dampens the growth of the economy as a whole. De Groot (2001) proposes a two-sector model with a non-competitive labour market which generates a negative cyclical interaction between unemployment and growth: unemployment hampers growth and a slow pace of growth exacerbates unemployment. As in the previous models, the engine of growth is the accumulation of specific knowledge or innovations. The existence of the trade union leads to the formation of a dual labour market with wage differentials not justified solely by equivalent differences in productivity. This distorts the labour supply and creates unemployment. An increase in the union's bargaining power pushes up real wages in the high-tech sector and alters the composition of output in favour of the traditional sector. Hence, because of the presence of the trade unions the relation between unemployment and growth can be negative.

According to Daveri and Tabellini (1997), the higher real wages due to the presence of the trade unions induce firms to intensify their use of capital in production processes, causing a reduction in the marginal productivity of

capital and a fall in profits. Since capital is prevalently owned by the more elderly, who manifest a greater propensity to save than young people, a fall in aggregate saving and investments in research and development is obtained.

The effect on growth depends on how aggregate saving is influenced by the distribution of income among the production factors. For example Bertola (1993, 1996) maintains that the propensity to save on wages may be higher than the propensity to save on profits, so that a redistribution of capital in favour of wages may foster development, sustaining the accumulation of capital and innovations. Bertola (1994) emphasizes the hold-up problem arguing that investments are discouraged by an increase in the unions' bargaining power. Lingens (2002) assumes that the trade unions are able to extract rent by means of wage bargaining in the intermediate, imperfectly competitive sector, but not in the perfectly competitive sector of research. Consequently, unemployment in the intermediate sector shifts labour supply to the research sector, in which a fall in relative wages makes it economically convenient for firms to employ a larger number of researchers. There is therefore a positive effect on innovations and growth which outweighs the negative effect due to lower employment in the intermediate sector. Palokangus (2003) uses a model of endogenous growth generated by the research sector to argue that unemployment is caused by efficiency wages: the presence of the trade unions, which bargain the allocation of profits with firms, shifts skilled labour from the intermediate sector to the research sector and reduces profits in favour of wages, with a consequent brake on growth. Parreño and Sánchez-Losado (1999) analyse the relation between endogenous growth and the role of the trade unions, in a model where output depends both on physical capital and on human capital. The latter is reproduced with constant returns and constitutes the true engine of growth. The accumulation of human capital is undertaken by benevolent parents for bequest reasons. In this scheme, the effect of the unions, which are able to extract higher real wages, on growth ultimately depends on the degree of altruism, that is the incentive to educate children, and on the bequest motive, that is the incentive to work more for a higher wage in order to save more to leave as a legacy to the children.

The foregoing survey of recently developed ideas on the role of the labour market institutions and of labour protection rules in economic development shows that the results depend on the hypotheses adopted on certain basic components. Is the marginal propensity to save on wages greater or smaller than the marginal propensity to save on profits? Do older people save more or less than the younger generations? Is the distribution of labour among the sectors rigid or does it respond to marginal allocative criteria? Choosing either one or the other hypothesis leads to conclusions that may be even

diametrically opposed, given that growth is led by development of the research sector, and given that the presence of the trade unions may modify the distribution of labour among production sectors and that of incomes between labour and capital.

The book is organized as follows. Section One has two chapters on human capital accumulation, and the functioning of the research sector and innovation. Section Two analyses the role of consumption variety and quality innovation in stimulating growth. Section Three is dedicated to analysing imperfect labour markets, wage inequalities and human and physical capital accumulation. Finally, Section Four examines the opportunities and the possibilities of public policy to ensure more rapid economic growth and a fair income distribution.

SECTION ONE: HUMAN CAPITAL AND INNOVATION

Chapter 1, by Alberto Bucci, focuses on the link between product market competition and economic growth within an economy where the engine for economic development is investment in education. It is assumed that there exist three vertically integrated sectors. A competitive final output sector produces a homogeneous consumption good employing a constant returns to scale technology. The intermediate goods sector consists of monopolistically competitive firms, each producing a differentiated variety employing only human capital. The research activity produces designs (or blueprints) for new intermediate input varieties by employing only human capital, as well. When a new blueprint is discovered in the competitive R&D sector, an intermediate good producer acquires the perpetual patent over it. This allows the intermediate firm to manufacture the new variety and practice monopoly pricing forever. Population is stationary and a representative household invests portions of its fixed-time endowment to acquire formal education. Hence, in the model human capital can be used in every sector in order to produce, respectively, a homogeneous final output, capital goods, infinitely-lived patents and new human capital. The main conclusion by Bucci is that there is a positive relationship between product market power and aggregate productivity growth.

Chapter 2, by Maria Rosaria Carillo and Erasmo Papagni, analyses the effects on economic growth of the basic characteristics of scientific research such as its organization, its reward structure and the social interactions among researchers. It is assumed that a scientist, according to the priority rule, is rewarded not for his effort, but for his achievement. In this sense the race for priority can be compared to the patent race where the winner takes all and the outcome is uncertain. The productivity of researchers depends not

only on personal effort but also on the effort of other researchers with whom a researcher interacts. Finally, academic research is chiefly financed by the state due to the public good nature of academic knowledge. The chapter shows that the social interactions between scientists may have an ambiguous effect on effort in the research activity carried out by a single scientist: it may be positive when group size is not too large and it may become negative beyond a critical size. Moreover, an increase in the fixed component of the salary reduces the possibility of the emergence of a no growth trap, where no research activity occurs, but it reduces the effort of a single individual in the research activity; the opposite effect emerges when the priority-based reward is increased. The reward of prestige always has a positive effect on effort and the probability of success.

SECTION TWO: VARIETY AND QUALITY INNOVATION

Chapter 3, by Mauro Caminati, attempts to set some guideposts on the relation between variety, consumption and growth, while abstracting from the well-known effect that variety may exert on productivity, through specialization. A mechanism is first described, through which preference for variety expressed by intertemporally optimizing consumers perfectly predicting the endogenously growing future consumption opportunities can cause faster steady-state growth. The mechanism amounts to a substitution of future for present consumption causing a higher steady-state savings ratio. The chapter shows that this growth-enhancing effect of preference for variety may not be unambiguous if the creation of new goods is endogenous and costly. Some of the results obtained in this part of the chapter hinge upon the assumption that there are constant returns to the endogenous factor, all factors are producible and that each type of variety can be used both as a consumption good and as an intermediate good in the production of capital by competitive firms. Dissatisfaction with the approach to preference for variety and innovation within the mechanism above is then motivated. The approach is oblivious of endogenous preference formation and the relation between innovation, consumption knowledge and consumption activities. Some research implications concerning long-term growth analysis in a world of endogenous preference formation are then drawn.

Chapter 4, by Davide Gualerzi, focuses on the relationship between consumption composition, growth and distribution. Only by focusing on investment and innovative investment in particular, can the issue of changes in consumption composition, both as a structure of expenditure *and* commodity-based forms of needs satisfaction, become fully relevant for growth theory. This has eluded most analysis despite the many efforts to take

account of product innovation and more recently variety in consumption. What is required is an independent account of consumption in the framework of a demand-led view of growth. Consumption choice then becomes part of the contribution of consumers to the establishment of new commodities in the transformation patterns of consumption, something that is shown to be implied by the extension of the principle of effective demand to the long run.

Chapter 5, by Carmelo Pierpaolo Parello and Luca Spinesi, is concerned with whether the determinants of patent infringement and declaratory judgement suits may affect both long-term economic performance and income distribution. A quality-ladder R&D-based endogenous growth model is presented, in which the institutional setting devoted to patent protection directly impacts upon the long-run private incentive for R&D. By ruling, the courts' interpretation of patent law generates the coexistence of the leader's and follower's product, especially in those patent suits where lagging breadth is at the core of litigation. For the quality leader, the existence of a positive probability of losing a patent suit against a potential producer of an inferior product constitutes a threat for its monopoly position affecting its strategic behaviour. The chapter shows that both the institutional setting and the court's behaviour actively affect both long-term growth performance and income distribution.

SECTION THREE: EMPLOYMENT AND INEQUALITY

Chapter 6, by Renato Balducci and Stefano Staffolani, examines the relationship between the functional distribution of income and growth. Using an endogenous growth model based on human capital accumulation and on the hypothesis that firms must invest part of their profits in physical capital while households optimally allocate their earnings between consumption and investment in human capital, the chapter determines the labour share that maximizes expected utility. It investigates the determinants of factor shares in a 'short-run' perspective using an efficient bargaining model between firms and unions. Our main result is that the optimal labour share can be higher than that arising from perfect competition in the labour market. Therefore, trade unions are necessary for optimal economic growth.

Chapter 7, by Andrea Mario Lavezzi and Nicola Meccheri, studies the effects of social networks on wage inequality and aggregate production by considering a simplified version of the Calvo-Armengol and Jackson (2003) model, with good and bad jobs and skilled and unskilled workers. The main findings are the following. Firstly, increasing the number of social links increases aggregate output and may reduce inequality; secondly, given a number of social connections, output increases if the average distance among

workers decreases; finally, a more mixed and well-integrated society, that is a society in which heterogeneous workers share social links, produces more output and less inequality than a society in which some workers are isolated, when productivity of the most productive agents in the best jobs is sufficiently low.

Chapter 8, by Salvatore Capasso, studies the interactions between crime, incentives to commit crime and economic development and growth. A low level of economic development implies a higher degree of poverty and, to the extent that poverty is the major cause of crime, a high level of criminal activity. Moreover, economic stagnation can further increase the crime rate if it increases inequality in income distribution. Crime can negatively affect economic growth by affecting return on investments and business profitability. The idea is that a high diffusion of criminal offences, like extortion, affects the riskiness of investments and the return on legal activities. This chapter offers an alternative interpretation of the causal relationship between the degree of criminal activity, income distribution and economic growth. The key proposition is that the level of criminal activity in the economy can not only influence the return on private investment, but also the efficiency and the return on public investments. A high level of crime forces the government to invest in security and measures to ensure public order, like the financing of police, courts and prisons. This misallocation of resources, which are diverted from investments in more productive activities like education and research, undoubtedly has a detrimental impact on growth.

Chapter 9, by Francesco Drago, provides a job search model where individuals with the same productivity may have different arrival rates of better jobs because of different degrees of self-confidence. This behavioural trait determines individual investment in social capital through which workers think to signal their ability. Workers with higher degrees of self-confidence experience higher job arrival rates not as a consequence of signalling (since employers do not observe the ability), but because workers who signal provide higher optimal search effort. Self-confidence and search effort turn out to be complements in the performance of the search activity and the effectiveness of self-confidence is endogenously determined. Moreover, the effects of redistributing policies of opportunities that aim to compress the distribution of job arrival rates can be analysed. It is shown how the presence of social norms when redistribution is effective interacts with the efficacy of self-confidence for search activities. Since the adherence to norms is endogenous, multiple equilibria characterized by different degrees of effectiveness of the redistributive policy may be generated.

SECTION FOUR: PUBLIC POLICY

Chapter 10, by Renato Balducci, sets out to verify whether the results obtained by Barro (1990) in relation to the influence of both productive investments and public consumption on the economic rate of growth are correct. As is well known, public expenditure may exert an effect on the economic growth rate through the positive externality in the productivity of the private capital stock induced by public investment. When public consumption in the households' utility function is considered, a further effect operates, which modifies saving and consumption decisions of the household depending on the relative weight of public consumption. In particular, if households evaluate public consumption positively, whatever the exogenous fiscal policy and its composition, the growth rate is always higher than that in the case of productive investments alone. Moreover, when households choose the optimal fiscal policy and its optimal composition, an optimal growth rate γ^* equal to the maximum γ° may be obtained through a different policy which favours not only productive investments but also public consumption.

Chapter 11, by Pasquale Commendatore, Carlo Panico and Antonio Pinto, analyses the connection between government intervention and distribution in the Kaldor–Pasinetti tradition. Their model considers an economy with similar features to that of You and Dutt (1996). The results achieved show that a larger government deficit produces a higher government debt, an increase in the *rentiers'* share of wealth and a reduction in the workers' share. Moving on to the effects on the distribution of income, a larger government deficit produces a higher public debt and an increase in the *rentiers'* total revenues, measured in terms of the net income of the economy. As to the effects on the total revenues of the working class, measured in terms of the net income of the economy, they are the following: if the rate is stabilized at a given level, the pre-tax total revenues remain constant, while the after-tax ones increase, like those of the *rentiers*. Thus, a larger government deficit and debt makes both classes better off, as far as their earnings are concerned. Yet, income inequality increases, since the benefits received by the *rentiers* are greater than those received by the workers. On the other hand, if the rate of interest is not exogenously given, both the pre-tax and the after-tax revenues of the working class decrease. Finally, the model shows that an increase in the government deficit has a positive effect on the rate of growth, while a change in the rate of interest leaves the rate of growth constant.

Chapter 12, by Massimiliano La Marca, investigates the relation between foreign debt, growth and distribution in an investment-constrained open economy. It proposes an alternative framework to contribute to an old

debate: the definition of the possible policy tools to achieve debt sustainability, tolerable distribution, growth and employment and the opportunity of rescheduling and/or forgiving part of the outstanding debt. The suggested interpretation is the well-established framework of an investment-constrained economy; the chapter emphasizes the role of effective demand, relative prices, distribution between broadly defined sectors and aggregate demand feeding back onto each other, and can be therefore ascribed to the Keynes–Kaldor–Kalecki and structuralist tradition. Some fairly intuitive outcomes are grounded on a solid analytical basis and suggest major international and non-standard domestic policy implications.

Chapter 13, by Guido Cozzi, shows that in a ‘capitalist economy’ where there is no ‘creative destruction’, and in which financial intermediaries collude, if households have perfectly diversified portfolios they will prefer lower R&D investment and growth if they are rich, and higher R&D and growth if they are poor. Hence, the richer the wealthy group that controls the financial sector, the lower the equilibrium innovation: in this sense inequality harms growth. If profit taxation is present, the higher the tax rate the faster is growth no matter whether taxation is purely wasteful or redistributive. In this model profit taxation proves beneficial to growth because it reduces the incentive for rich influential shareholders to resist growth. The equilibrium growth rate always increases with the marginal tax rate of the richer incomes. Of course, taxation may not be efficiency-enhancing: the trade-off is between lower taxation and higher aggregate growth, but it is not claimed that growth is beneficial *per se*.

Chapter 14, by Luciano Fanti and Luca Spataro, adopts the traditional competitive OLG model *à la* Samuelson–Diamond with two-period-living individuals, fixed fertility rates and labour supply, where the government can pursue redistributive policies between generations by levying lump sum taxes or subsidies. By using standard logarithmic preferences and a CES technology with low factor substitution, the authors show that the taxation of the old can be used: 1) to escape from a poverty trap; 2) to increase the per capita income in the positive high steady state. Conversely, the taxation of the young worsens the stationary per capita income and may in fact lead to the explosion of the economy. This result may be applied to policy analysis in developing countries: the introduction of a PAYG social security scheme as a means of redistributing among generations may be detrimental for economic growth and for the poverty trap. This argument may also be applied to rich countries which have escaped from poverty traps. Conversely, the introduction of such instruments as public education or subsidies to children may be positive for both economic growth and the solution to the poverty trap.

This book is one of the main products of a research group. Each chapter was discussed several times by members of the group and at least once within a debate which involved one or two discussants. On the basis of the results of the discussion, one of the discussants, or both, then supervised the editing of the paper. Some papers have been excluded on the basis of this procedure and others have been heavily revised. The process revealed that at times non-anonymous discussants can be much more demanding than anonymous referees.

NOTES

1. Some attempts were made to endogenize both the population growth rate, setting it in relation to the real wage rate and the growth rate of productivity. For a detailed account see Pomini (2003).
2. See Romer (1986, 1990), Lucas (1988), Barro (1990), Rebelo (1991), Mankiw, Romer and Weil (1992), Aghion and Howitt (1992, 1994, 1998), Grossman and Helpman (1991), etc.
3. For a critique on the use of ‘knowledge’ as a quantity, see Steedman (2003).
4. ‘Now different agents or different classes of agents face different feasible action sets. This on its own can be expected to affect an economy’s saving behaviour since different groups face different possibilities of transforming foregone into future consumption’ (Hahn, 1994, p. 14).
5. Let us recall: complementarity between capital and labour using the CES production function with elasticity less than unity (Rowthorn, 1977); skill-based nature of technological change and the existence of complementarities between technology and human capital (Acemoglou, 1996); non-competitive labour markets in growth models where the propulsive factor is human capital; production externalities, where the scale factor depends on the number of the employed (Stadler, 1990); lower propensity to save of the unemployed, which reduces accumulation; adjustment costs which prevent the updating of old jobs to new technical standards (Aghion and Howitt, 1994; Goldin and Katz, 1996; Redding, 1996).

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