Nierówności Społeczne a Wzrost Gospodarczy, nr 47 (3/2016)
DOI: 10.15584/nsawg.2016.3.23 **ISSN 1898-5084**

mgr Riccardo Valente[1]

Ph.D. Student, Department of Economics and International Relations
Cracow University of Economics

Mainstream and Heterodox Sources of Endogenous Growth: Some Linkages and the Role of Income Distribution

INTRODUCTION

The present article focuses on *mainstream* and heterodox sources of endogenous growth with particular concern for their possible integration and the role played by income distribution and it is part of wider analysis to which the author is committed. In previous published and unpublished works, indeed, the presence of two main approaches to physical capital accumulation and income distribution linkages emerged.

In particular in a former article [Valente, 2014] author pointed out that, on the basis of an integrated Keynesian-Sraffian approach, income redistribution can be treated not only as a way to improve social equality or social justice, which can be both differently conceived on the basis of subjective ethical judgments, but can be properly seen as a way to improve economic system efficiency, its stability and both physical capital accumulation and long-run economic growth as well. Another forthcoming work [Valente, 2016] argued, instead, that, on the basis of an introductory data analysis based on Piketty [2014] seminal work and GDP data from Maddison database, the long-run evolution of income inequalities, 'capital' accumulation and economic growth in main market economy (as to say U.S.A., U.K., France and Germany) during the whole 20th and 21st century are more in line with a Classical-Keynesian theoretical framework of analysis than with the widely accepted in economic literature *mainstream* one.

In accordance with formerly achieved results, present article is then dedicated to the analysis of possibility of integration of more *mainstream* based human capital accumulation and technical change, on one hand, and more heterodox

[1] Post address: Applied Economics Chair, Room 525, Pawilon Ustronie, Cracow University of Economics, ul. Rakowicka 27, 31-510 Kraków; e-mail: riccardo.valente86@gmail.com.

based physical capital accumulation path-dependency from short and long run aggregate demand and income distribution evolution, on the other. Such integration seems to the author much needed both on the basis of the commitment of some endogenous growth theory *mainstream* authors to the study of income distribution effects on human capital accumulation and growth [e.g. Galor & Moav, 2004; Galor, 2006], as well as on the basis of heterodox authors interest for a deeper commitment to income distribution analysis, short-long run divide overcoming in economic theory and search for possibility to take properly into account the increased role of human capital accumulation and technical change in modern economies [e.g. Petri, 2003, 2013; Setterfield, 2014]. According to the author, moreover, the inquiry of income inequalities and income distribution effects on different kinds of endogenous growth sources is surely of interest due to increased attention income distribution matters have recently received in both economic literature and public opinion, as a result of Piketty [2014, 2015] works publication.

First section will focus on *mainstream* authors' elaboration concerning both human and physical capital accumulation as well as income distribution effects on both of them and economic growth. Second section presents and discusses heterodox authors approaches, while third will provide some introductory results concerning heterodox and *mainstream* approaches possibilities of integration. Forth section will conclude arguing that such integration can increase the relevance of both heterodox and *mainstream* endogenous growth sources, help to overcome the division between cycle and long-run economic dynamic study and possibly lead to increased attention for income distribution and income inequalities analysis in both applied and theoretical works.

EXOGENOUS AND ENDOGENOUS MAINSTREAM GROWTH THEORY: PHYSICAL CAPITAL, HUMAN CAPITAL AND INCOME DISTRIBUTION

The most renowned model in economic growth literature is surely the Solow model [Solow, 1956] and its subsequent evolutions [e.g. Makiw, Romer & Weil, 1992; Sala-i-Martin, 1990; Aghion & Howitt, 2007]. One of the most noticeable, and most criticized by heterodox authors, feature of that model is that physical capital accumulation is assumed to be strictly dependent on the long-run saving supply [Petri, 2003, p. 139], which is determined on the basis of an exogenically given propensity to save. Solow model is then directly based on the acceptation of long-run validity of Say's law [Petri, 2013, p. 1] and on the less clearly underlined in economic literature acceptation of long-run demand and supply functions of productive factors, which ultimately relay on the neoclassical concept of decreasing marginal productivity as the main determinant of both productive factor remuneration and utilization. As stressed in further *mainstream* elaborations based on Solow model [Sala-i-Martin, 1990] the saving supply is assumed

to be restraining physical capital accumulation in the long run. Due to this very assumption, exogenous increases of propensity to save are expected to foster saving and, through investments and physical capital accumulation rate increases, lead to temporary rises of economic growth rate. In such a framework income inequalities increases will lead to increases in propensity to save, thus, temporary rising physical capital accumulation and economic growth rate. Income inequalities reduction will cause instead, *ceteribus paribus*, the opposite effect [Sala-i-Martin, 1990, p. 10-13].

However, as already stressed in many both *mainstream* and heterodox works [e.g. Sala-i-Martin, 1990; Setterfield, 2014], in Solow model economic growth is strictly exogenously determined, depending on extra-model independent variables such us: labour force supply long run evolution (many times, oddly considered in *mainstream* literature just as being equal to demographic growth [Setterfield, 2014, p. 368]),[2] propensity to save, income distribution and technical change. While heterodox authors focused mainly on the first three factors, successive *mainstream* authors tried mostly to assess the determinants of technical change or to endogenize growth, taking into account technical change and/or innovation as variables determined inside the models, including into them human capital alone or both technical change and human capital as separate sources of endogenous growth. This has then led to various kinds of *mainstream* endogenous growth models such as: Romer [1986, 1989, 1990, 1994]; Lucas [1988]; Aghion & Howitt [1992, 2007]; Mankiw, Romer & Weil [1992]; Funke & Strulik [1998]; Zeng [2003]; Galor & Moav [2004]; Galor [2006].

Leaving aside the specific details of formulations of different types of *mainstream* endogenous growth models, the present article will focus only on few endogenous growth models, in which a positive relation between physical and human capital accumulation is argued to exist. Moreover, both direct and indirect ways in which higher economic growth rate or both human and physical capital accumulation rate can be expected to have a general positive influence on innovation and technical change will be shortly considered. In third section it will be, then, underlined that, although the present paper focuses mostly on human and physical capital accumulation linkages, rejection of *mainstream* and neoclassical assumptions about aggregate demand and income distribution effects on physical capital accumulation and economic growth can affect the whole *mainstream* endogenous growth literature. Due to the fact that many intrinsic linkages between physical capital, human capital and technical change assumed to exist in economic theory, indeed, changes in the way in which physical capital accumulation is conceived affect not only models which consider

[2] Considerations about long-run labor endowment evolution will be shortly considered in section three, underling how assuming that it is endogenously determined independently from other in-system variables and equal to demographic growth rate cannot be considered as a enough general hypothesis in economic growth theory.

human capital as the sole source of endogenous economic growth, but even models which either take into account only technical change as a source of endogenous growth or attribute to both human capital and technical change such a role.

As already underlined in the literature [Jabłoński, 2011, 2012], *mainstream* authors stress the existence of a positive linkage between human capital accumulation and physical capital accumulation. This paper focuses mainly on the arguments given in Mankiw, Romer & Weil, 1992 and Galor & Moav, 2004. Those have been so far two of the most often quoted *mainstream* models presenting linkages between physical and human capital accumulation and can be considered somehow representative of larger consensus of *mainstream* literature on the matter. In Mankiw, Romer & Weil, 1992 [p. 407-408, 418, 432-433], propensity to save, through its direct positive effects on saving supply and physical capital accumulation, positively affects human capital accumulation, and then economic growth. In Galor & Moav work [2004], instead, much more complex interactions are presented and both income distribution effects on each kind of capital accumulation and historical process of development, which took place in market economies, are diffusely considered.[3] The reasons according to which physical and human capital accumulation are supposed to be positively linked in this second paper are twofold.

On one hand, Galor & Moav [2004, p. 1004] assume that a complementarity of physical and human capital in the process of production exists. Similarly to Mankiw, Romer & Weil, even in Galor & Moav [2004] higher levels of physical capital accumulation or dotation are supposed to induce need for higher level of accumulated human capital. Being typically *mainstream* supply-side limited, physical capital accumulation and dotation is supposed to be positively dependent upon increases of propensity to save and long-run savings supply.

On the other hand, Galor & Moav accept that a positive dependence of human capital accumulation on physical capital accumulation increases exists, due to a second completely independent set of reasons. They explicitly argue, indeed, that increases of physical capital endowment will lead, *ceteribus paribus*, to a progressive reduction of rate of return from further investment in physical capital in comparison to rate of return from investment in human capital. This will increase the relative convenience of investment in human capital, fostering its accumulation when high level of physical capital dotation are reached, due to former high physical capital accumulation [Galor & Moav, 2004, p. 1010]. Such a conclusion relays directly on the acceptation of the typical neoclassical and *mainstream* principle according to which, when endowment of a given factor increase in comparison with other inputs endowment, first factor marginal

[3] An extended presentation of both similar historical considerations and arguments which, according to one of those authors, justify the existence of positive linkages between human and physical capital accumulation can be also found in [Galor, 2006].

productivity will decrease, leading to a fall of unitary remuneration of this factor. So, even leaving aside first kind and independent arguments concerning Say's law acceptation and complementarity between human and physical capital utilization in the productive process [in Galor & Moav, 2004], a direct linkage to neoclassical theory of simultaneous determination of income distribution and quantities of productive factors can be found. The assumption, that reductions of the rate of return from physical investments will be induced from increases of physical capital accumulation rate and endowment, indeed, relays on such a principle.

While technical change theorists are generally much vaguer than *mainstream* human capital theorists about income distribution and propensity to save changes effects, in *mainstream* literature, a positive linkage between income inequalities and technical change exists as well. Different endogenous growth theorists, who focus on technical change and innovation, admit, indeed, that those are either positively liked with human capital accumulation, physical capital accumulation, economic growth rate or all of those variables at once [e.g. Funke & Strulik, 1998; Zeng, 2003; Aghion & Howitt, 2007]. As already stressed in the literature [Petri, 2003, p. 146-150], then, arguments about income inequalities' positive effects on physical capital accumulation, presented in human capital and Solow models, can be directly[4] or indirectly[5] extended and applied to *mainstream* models regarding technical change and innovation as the main source of endogenous growth, too.

Due to the positive direct or indirect influence of physical capital accumulation on both human capital accumulation or technical change, in *mainstream* endogenous growth models positive dependence of physical capital upon income inequalities generates not only temporary changes of growth rate, as it was in the case of *mainstream* exogenous growth models, but its stable increases through their influence on endogenous factors of growth as well [e.g. Sala-i-Martin, 1990, p. 12-13]. It seems however important to point out that the existence of a positive influence of income inequalities on physical capital accumulation, which will through it positively affect human capital accumulation and long-run economic growth, is based, in all of the papers considered, on the acceptation of two different kinds of *mainstream* principles. The first, originally present in Solow model and explicitly accepted in most of the *mainstream* papers considered, is the long-run validity of Say's law. The second assumption, directly recalled only in Galor & Moav [2004], but anyway implicit and instrumental in

[4] That is to say, through the consideration of both a positive dependence of technical change and/or innovation upon increases of physical capital and the typically *mainstream* positive dependence of the latter upon high income inequalities or high propensity to save.

[5] Such an extension can be justified considering: a) the existence of positive linkages between technical change and/or innovation, on one hand, and human capital accumulation, on the other, b) the existence of physical capital and human capital positive linkages and c) the existence of positive effects of higher inequalities or higher propensity to save on physical capital accumulation.

justifying *mainstream* Say's law acceptation, is the long-run validity of neoclassical productive factors demand curves, conceived as strictly and monotonically decreasing functions of factor endowment (taken in value or physical quantities), on the basis of decreasing marginal productivity principle. Both Say's law and neoclassical productive input demand functions validity have, however, been questioned in various ways by different heterodox authors. In productive factor demand function case, moreover, the total rejection of both long and short run theoretical validity of such a principle has been since long accepted even by highest rank *mainstream* economists [Samuelson, 1966, p. 568, 578].

TWO CAMBRIDGES CAPITAL CONTROVERSY, KEYNESIAN ACCELERATION MECHANISMS AND AGGREGATE DEMAND AS ENDOGENOUS GROWTH SOURCE

According to both heterodox theoretical elaboration [e.g. Garegnani, 1966, 1983, 2011; Garegnani & Palumbo, 1997; Pasinetti & Scazzieri, 1987; Cohen & Hancourt, 2003; Petri, 2011; Schefold, 2013] and heterodox empirical studies based either on mathematical simulations [Zambelli, 2004; Petri, 2011] or empirical analysis of evolution of real economies [Han & Schefold, 2006], the so called *reswitching* of techniques can take place.[6] Thus, neoclassical and *mainstream* assumption that a negative correlation between quantities or value of factor endowments and their marginal productivity and remuneration exists is neither generally valid in theory nor necessarily and always verified in practice.

As argued by heterodox authors and accepted by mainstream ones [Garegnani, 1962, 1966; Samuelson, 1966], indeed, the application of decreasing marginal productivity principle to physical capital can be considered as an improper extension of arguments conceived by classical economists for productive factors that, as land and labour, are measured in physical quantities, which do not variate when income distribution changes [Garegnani, 1966, p. 562]. Differently than those factors, however, in neoclassical and mainstream theory, physical capital is not taken in physical quantities, but as a monetary value, which is not invariant with respect to variations of income distribution and consequent changes of price and value of different and heterogeneous capital goods, which constitute economy physical capital endowment. Only due to the fact that variation of different capital prices were not considered in basic neoclassical and *mainstream* theory formulations, *mainstream* economists could extend arguments presented by classics which are valid just in the case in which all the factors of production are taken in terms of physical quantities and/or a single homogenous capital good is present in the economy. As demonstrated by Sraffa

[6] A useful, although very short, summary of the Two Cambridges' Controversy results can be found in [Galbraith, 2014].

[1960], indeed, prices of different capital goods variate when income distribution variates. As highlighted in Chart 1, then, is not possible to exclude that, if two different goods are considered, the one requiring a more capital intensive technique will always appreciate when profit rate increases. Similarly, there is no reason to rule out the possibility that when rate of profit increases and two different methods of production of the same good are considered, the price of production obtained on the basis of the more capital intensive technique will be higher than the price of production of the very same good obtained on the basis of initially less capital intensive technique.

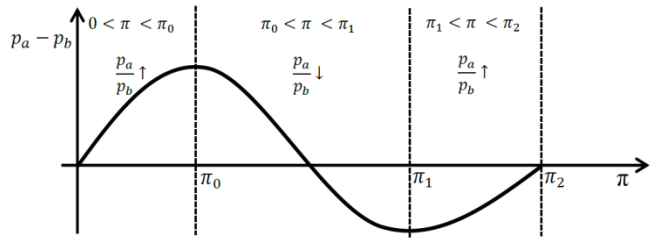

Chart 1. Relative prices [p_b] of goods produced with more and less capital intensive techniques variations when profit rate [π] varies

Source: author elaboration on the basis of [Sraffa, 1960].

As theoretically demonstrated by Garegnani [1966, p. 562-563, note 3; 1979b, p. 36-38] and confirmed by empirical studies of other authors [Han & Schefold, 2006], once different heterogeneous capital goods are considered, neither capital demand function, nor other factors demand function can be expected to be monotonously decreasing functions of their own rate of remuneration and can look as in the Chart 2.

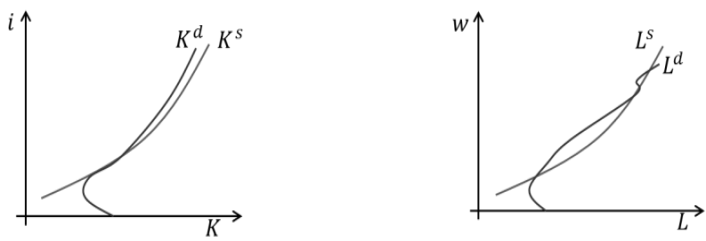

Chart 2a and 2b. Not monotonic productive factor demand functions: general case

Source: author elaboration on the basis of Figure 2a.2 in [Garegnani, 1983, p. 72].

This leads, then, firstly to the result that no regular relation between a given factor remuneration rate and endowment can be expected to generally show up in the economic system. Arguments about positive human and physical capital

relation through the relative decrease of rate of return from investment in physical capital in comparison with the rate of return from investment in human capital, when physical capital endowment increases [Galor & Moav, 2004, p. 1010] can, thus, be negated. Those, as well as other similar *mainstream* arguments, will not be further considered in this article.

Secondly, Two Cambridges Capital Controversy results lead to Say's law complete negation as well. Being directly derived from long run neoclassical physical capital demand and supply function, the saving supply and investment demand function will indeed meet the very same problems [Garegnani, 1983, p. 72-73; Petri, 2013, p. 1-2]. On the basis of Two Cambridges Capital Controversy, then, a general rejection of neoclassical conception of simultaneous determination on the basis of marginal productivity concept of both factor endowment quantities or value and their remuneration can be argued. This means that *mainstream* theory regarding long run and short run evolution of factor endowment, economic growth and production, as well as *mainstream* income distribution theory cannot be assumed to be generally correct. Thus they can no longer be assumed to be a solid base to further economic enquiries as those lead by *mainstream* endogenous growth theorists [Petri, 2013].

Consideration of alternative approaches to income distribution, physical capital accumulation and economic growth determination may be considered fruitful by *mainstream* endogenous growth theorists, whose arguments, once Say's law and neoclassical factor demand functions are rejected, remain mostly correct and compatible with other theoretical approaches [Setterfield, 2014]. Let us, now, consider possibilities of integration of endogenous growth *mainstream* theorists' elaboration with post-Keynesian physical capital accumulation determination, on the basis of aggregate demand and income distribution evolution through variously justified and modelled acceleration mechanisms. Although not always explicitly underlined by Keynesians, those arguments are perfectly compatible with the rejection of neoclassical income distribution theory and with the loss of generality of neoclassical assumptions about factor demand functions [Garegnani, 1983, p. 75-77]. Moreover, the fact that factor endowment and production evolution will be dependent upon aggregate demand variations becomes much more plausible once possibility to recur to neoclassical demand and supply driven simultaneous determination of income distribution and factor endowments is excluded on the basis of above presented arguments [Garegnani, 1978, 1979a, 1979b].

One of the cornerstones of many heterodox economists' elaborations is the rejection of Say's law validity both in the long and the short run. This is due to the fact that, independently by Two Cambridges Capital Controversy results, according to Keynesians short run increases of aggregate demand positively affect physical capital accumulation, potential level of production growth rate and both aggregate demand and effectively reached level of production long run

growth rate. Since both potential level of output and effectively reached one are argued to be positively correlated with (short and long run) increases of aggregate demand, even if propensity to save reduces or does not change, both potential full-employment long run saving supply and effectively available saving supply can increase if aggregate demand increases. In consequence, as assumed by Keynes in the case of short run investments and savings equilibrium, even long run physical capital accumulation rate is not limited by long run saving supply. In heterodox literature it is, instead, argued that the latter is positively dependent on physical capital accumulation rate. [cfr. e.g. Petri, 2003, 2013]

In Keynesian approaches, indeed, once increases of aggregate demand are registered, they will not only affect current level of production but induce increases of future level of potential production as well. As shown in Chart 3, then, no mechanism can ensure that short run fluctuations will be converging through a potential production balanced growth path formerly and independently given on the basis of exogenous factors. Short run boom and bust will, instead, cause long run potential production growth path variations.

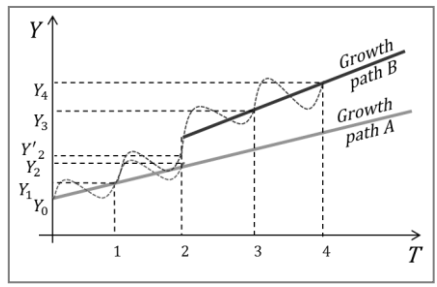

Chart 3. Keynesian potential and registered output levels path-dependency from effective demand evolution.

Source: author elaboration on the basis of Figure 2a.3 in [Garegnani, 1983, p. 77].

In Keynesian approach, both potential and effectively registered output evolution are path-dependent from their past short run level, determined on the basis of aggregate demand evolution. Through such a path-dependency mechanism of long run economic growth from short run shocks, aggregate demand can be, thus, regarded as an additional autonomous source of endogenous growth in the long run. It would, then, have to be properly taken into account together with other endogenous growth sources analysed in *mainstream* literature, being strictly linked with them and most probably affecting them too.

The path-dependency mechanism considered in Keynesian theory is in particular strongly tied with investment and physical capital accumulation evolution and the presence of variously modelled and theoretically justified acceleration mechanism. Since physical capital accumulation is admittedly linked to human

capital and technical change long run evolution on the basis of same *mainstream* authors considerations, it seems, then important to present a selection of arguments, which, according to various heterodox authors, justifies physical capital accumulation path-dependency from both its own past level and effective demand past levels.

The presence of an acceleration mechanism, which will lead to increases of investment and physical capital accumulation rate when either consumption or investment demand increases in the short run, is argued by various Keynesian authors. A first set of arguments can be found directly in General Theory. Keynes [1936, p. 71], indeed, considered entrepreneurs inducement to invest to be directly positively dependent from current aggregate demand and propensity to consume levels. According to his reasoning, entrepreneurs will increase investment only if they are expecting that the current realized investments will not generate such an amount of adjunctive productive capacity, which will be sufficient to satisfy future levels of aggregate demand. If, as in the case of effective demand increases derived from propensity to consume rises, current increases of effective demand will be considered by entrepreneurs not only temporary, but as probably lasting in the future as well, inducement to invest will increase and entrepreneurs will realize extra investments in the current period. Those will have positive multiplicative effects on demand and production, generating savings supply increases able to cover additional investments, which are currently taking place. In a long run perspective this mechanism can be, then, seen as a stable rise of physical capital accumulation rate, which can be maintained in the future and lead to stable increases of long run growth rate of both production and savings supply, as far as aggregate demand increases will last.[7] Long run saving supply evolution cannot, then, limit physical capital accumulation rate more than it limits investment demand evolution in a short run Keynesian analysis framework. Opposite than in *mainstream* theory, thus, causal linkage will run from higher physical capital accumulation, or investment, to greater amounts of long and short run supply of savings. Evolution of the latter will consequently be imposing no upper limit to accumulation and growth both in the short and in the long run.

A second set of reasons according to which Say's law long run validity can be negated and both investment and long run physical capital accumulation can be assumed to be positively dependent from aggregate demand and their own former levels, can be found also in the heterodox literature inspired by Michał Kalecki work. In Kalecki original elaboration and its further development, investment is assumed to be positively dependent from profit rate or total profit

[7] An attempt of introductive mathematical representation of Keynes and others Keynesian authors' arguments was presented in a former paper by the author [Valente, 2014, p. 61-67], although less specifically based on the cited Keynes arguments, further formalizations can, moreover, be found in post-Keynesians empirical analysis such as: [Onran & Stockhammer, 2001a, 2001b; Lavoie & Stockhammer, 2012; Onran & Galanis, 2012].

level [e.g. Kalecki, 1956; Bhaduri & Marglin, 1990; Onran & Stockhammer, 2001a, 2001b]. Differently than in *mainstream* theory, moreover, it can be demonstrated both on the basis of theory [Kalecki, 1956; Bhaduri & Marglin, 1990] and of recent empirical studies [Onran & Stockahammer, 2001a, 2001b; Onran & Galanis, 2012; Lavoie & Stockhammer, 2012] that the latter is in most of the cases positively dependent upon initial increases of labour share, wages, aggregate demand components and propensity to consume. Such a result is consistent with formerly presented arguments from the General Theory and further heterodox approaches firstly worked out by Garegnani. According to the author of the present article, the presentation of this last group of arguments, can in addition help to clarify how, although at a first look they seem incompatible with some very basic economic theory assumptions, those arguments are indeed coherent with them. While supporting long run negation of Say's law, arguments presented below can moreover help to reduce both the still lasting long-short run divide present in macroeconomic theory and the distance between heterodox and *mainstream* authors' approaches.

To *mainstream* economists, the positive dependency of inducement to invest, long run physical capital accumulation and profit upon income inequalities reduction and/or wages and salaries increases can seem at a first look at odds with two main propositions of economic theory. The first is the longstanding idea of entrepreneurs decision of investment derived from profit maximization. The second instead is the principle, according to which, as many time assumed in *mainstream* theory, a sufficient amounts of long run saving is necessary to finance investment, accumulation and growth, while savings are negatively dependent upon income inequalities reductions. It can be, however, demonstrated that, once it is admitted that effective demand can limit production in the short run, this dependency is perfectly compatible with both general economic knowledge and results of empirical studies which were recently conducted.

As stressed in the Garegnani, 1992, once that both short-run effective demand shortages are assumed to be possible and the fact that short run investments are not realized taking into account just current needs of production but their future evolution too is considered, the formerly presented results seem perfectly possible. It has at first to be appreciated that the fact that – as since then generally accepted in economic theory – Keynes affirms that short run effective demand shortages cause involuntary unemployment and lead to labour endowment underutilization, means that during recessions existing physical capital endowment is underutilized as well. It will be otherwise, impossible, to sustain that, if effective demand increased, unemployed would be readily occupied in the current short run without any need of capital endowment and productive capacity variation. Moreover, if existing productive capacity is not fully utilized, increases of production will not require current short period increases of physical capital endowment, but just a higher utilization of plants previously laying idle.

During recessions, then, increases of aggregate demand derived from redistribution from entrepreneurs to workers will increase the utilization of current available and underutilized capacity, so that increases of wages are not necessarily incompatible with increases of total profits and profit rate [cfr. Garegnani, 1962, 1992].

According to Garegnani, 1992, such a phenomenon can be, furthermore, regarded as perfectly possible on a general long run basis as well. In fact, in real economies level of production is not static and can be normally expected to increase during capital goods utilization live-span. It can be, thus, argued that the very nature of physical capital as a complex of plants and productive inputs which do not wear out in the frame of a single short period and will be used in production for next short periods till they do not completely wear out, leads to the need that at any time a certain part of currently available productive capacity is laying idle. Once an investment project is undertaken, indeed, the additional productive capacity which will result from it, has to be able to satisfy not just current or next short period production needs, but – the normally much higher – needs of production in the last year of capital good live span as well [Garegnani, 1992, p. 55]. In a world, where demand and production are not stationary and economic growth takes place, it seems then logical that, during their first years of live, new plants and capital goods are normally not-fully utilized. Unutilized productive capacity will, then, systematically be available in the economy. Those considerations are, moreover, reinforced on the basis of: a) presence of seasonal short run peaks of demand and production, determining short run seasonal availability of idle productive capacity; b) need for a very probable systematic not-full utilization of productive capacity in market economies due to uncertainty of future demand and production needs variations; c) perfectly rational need of precautionary or dissuasive extra capacity availability at single firm level during periods of unexpected demand peaks, as to avoid losses of market shares in favour with current and potential competitors and oppose to newcomers entrance in the market [cfr. Garegnani, 1992, p. 55-56]. Excluding the case of specific sectors bottle-necks, then, short run productive capacity can be assumed to be never fully utilized in any short period [cfr. Garegnani, 1962, 1992]. Resulting from the averaging of short runs capacity utilization rates, moreover, long run capacity utilization is evidently and generally not-full as well. If higher than expected short run utilization rates of recently installed capacity registered at any time and place will be regarded as stable and long lasting by entrepreneurs, they will moreover justify increases of inducement to invest, investments and physical capital accumulation, having positive effects on long run capital accumulation rate and economic growth [Garegnani, 1962, 1992; Petri, 2003, Onran & Stockhammer, 2001a, 2001b; Onran & Galanis, 2012; Lavoie & Stockhammer, 2012].

HETERODOX AND MAINSTREAM ENDOGENOUS GROWTH SOURCES, LINKAGES BETWEEN THEM AND THE POSITIVE ROLE OF INCOME INEQUALITIES REDUCTION ON GROWTH

Arguments presented above allow, now, to fully appreciate why income redistribution, income inequalities reductions and aggregate demand increases can be theoretically expected to increase both physical capital accumulation and economic growth rate. Those results are moreover confirmed both globally and at single country level by numerous heterodox economists' empirical studies.

In economic theory, income inequalities reductions are, indeed, recognized by economists of every orientation as source of propensity to consume increases, so that they will increase consumption demand. Accordingly to formerly presented arguments, increases of demand will raise short run level of production, capacity utilization and rate of profit [Keynes, 1936; Kalecki, 1956; Garegani, 1962, 1992; Petri, 2003; Lavoie & Stockhammer, 2012]. Assuming that evolution of other autonomous demand components will not change, such variations of demand, being increasing propensity to consume, will *ceteribus paribus* be lasting even in later periods. Registering increases of sales, capacity utilization and rate of profits, which can be regarded as stable and long lasting, entrepreneurs inducement to invest can thus be expected to rise. This will foster short run investment and physical capital accumulation, leading both to further increases of aggregate demand, growth of potential level of production and rises of long run and next period saving supply, so that increased aggregate demand will lead to both higher registered output growth rate and higher potential output growth rate [Garegani, 1962, 1992; Onran & Stockhammer, 2001a, 2001b; Petri, 2003; Lavoie & Stockhammer, 2012; Onran & Galanis, 2012].

As already stressed in the literature, those considerations can thus already have a significant effect on *mainstream* endogenous growth models. Once physical capital accumulation rate is considered as path-dependent and endogenously affecting both registered and potential long run output growth path, its evolution will affect human capital accumulation and technical change as well [Petri, 2003, 2013; Setterfield, 2014].

If, for the reasons presented above, it is accepted that physical capital accumulation rate and output growth path positively depend upon aggregate demand rises and income inequalities reductions, human capital accumulation rate can be expected to increase in response to such variations as well. Indeed, contemporary raises of both physical capital accumulation and registered output growth rate will both cause increased demand for human capital as a factor of production, due to the complementarity between it and physical capital asserted to exist in *mainstream* literature [Mankiw, Romer & Weil, 1992; Galor & Moav, 2004], and provide means for its higher accumulation through increases of aggregate

demand, production and output growth rate. The positive linkage between human capital accumulation and income inequalities reduction already considered by some *mainstream* authors [e.g. Galor & Moav, 2004; Galor, 2006] will, moreover, be confirmed and reinforced through this additional heterodox channel of income distribution-economic growth linkage. Positive influences of income inequalities reductions, indeed, will not be contrasted by a negative influence of those very same reductions on physical capital accumulation, as was considered to be possible in *mainstream* models. Accepting heterodox arguments, indeed, there is no reason why linkages between physical capital accumulation and income inequalities will cause, at some stages of economy development, negative effects of income inequalities reduction on human capital accumulation due to reductions of accumulation of physical capital, income, production and economic growth rate [Garegnani, 1992]. This last group of effect considered in mainstream literature derives, indeed, from Say's law acceptation, and once it is rejected, they cannot be expected to take place.

With regards to innovation and technical change, Say's law complete rejection will have significant effects, as well. Being technical change in *mainstream* literature assumed to be positively dependent on economic growth and accumulation of physical and/or human capital, it will be, indeed, positively affected by increases of aggregate demand and/or income inequalities reductions. Although Schumpeterian creative destruction effects of recessions cannot be ruled out [Aghion & Howitt, 2007], it seems however quite reasonable that both entrepreneurs investment in development and research of new productive possibilities as well as application of new techniques of production will be rather positively supported by positive conjunctures, higher level of sales, production and utilization of installed productive capacity than by negative ones [cfr. Petri, 2003, 2013; Setterfield, 2014].

It is, moreover, interesting to point out that the considered Keynesian arguments affect full-employment labour force evolution as well, already partially questioning *mainstream* considerations about negative long run linkages between initial wages or labour share increases and labour demand and employment reduction, independently from Two Cambridges Capital Controversy results [cfr. Petri, 2013]. Consideration of acceleration mechanisms, indeed, can lead to question that increases of a factor remuneration rate will always cause his lower utilization in the productive process, even if production methods are allowed to vary and technical change is supposed to induce variations of productive methods as those assumed on the basis of neoclassical factors substitution principle. As already highlighted in one of author former papers [Valente, 2014], indeed, if income redistribution and aggregate demand are positively affecting physical capital accumulation and economic growth, this means that, assuming stable methods of production, full-employment occupation level is positively affected and increasing as well. At least in a Keynesian framework, nobody is

questioning that employment can be not-full in the short run and will be positively affected by increases in demand and production, which can be connected with higher investments and physical capital accumulation rates. Due to those facts both full-employment and actually registered labour utilization cannot be assumed to be equal to demographic growth and exogenously given independently from others macroeconomic variables evolution in the long run.

Even assuming that, in presence of higher wages, there will be no *reswitching* of techniques and technical change will lead to labour-saving productive methods utilization, technical change effects can be counterbalanced by possible employment increases derived by physical capital endowment and production levels increases. Thus, neither in theory nor in practice, *mainstream* hypothesis that higher labour shares will lead to falls of employment and wages, can be regarded as a general and always justified assumption. Those considerations are reinforced by results of Two Cambridges Capital Controversy and the possibility that *reswitching* of techniques will take place. Although negative effects of technical change on long run employment evolution cannot be completely ruled out, on the basis of the heterodox and *mainstream* arguments synthesis, it seems, however, that both heterodox and *mainstream* authors' conceit of technical change as a factor which may lower employment in the long run cannot be always and certainly assumed to be verified.

The arguments presented in this paper, then, overall support the idea that aggregate demand and income distribution evolution can be considered as both relevant sources of endogenous economic growth by themselves and as factors significantly affecting *mainstream* endogenous growth sources. Heterodox theoretical elaborations and empirical studies confirming either positive dependence of physical capital accumulation upon former increases of production [Chandra & Sandilands, 2003] or positive dependence of both growth and physical capital accumulation upon income inequalities reductions and/or increases of aggregate demand [Onran & Stockhammer, 2001a, 2001b, Lavoie & Stockhammer, 2012, Onran & Galanis, 2012], can be reinforced and supported including endogenous growth *mainstream* theorists arguments. In such a framework, indeed, acceleration mechanism can be assumed to link not only physical capital accumulation, but also technical change, human capital and full-employment labour demand evolution with positive variations of aggregate demand and/or income inequalities reduction. For *mainstream* endogenous growth theorists, moreover, a complete release from exogenous determination of variables affecting long run economic growth can be useful and increase the importance of the study of factors and economic policies affecting human capital and technical change variations. Although not overly optimistic about future complete convergence between different schools of thought approach to economic growth and economic theory, according to the author, large possibilities of convergence and integration of *mainstream* and heterodox approaches seem, then, to exist and to be worth of

being furtherly explored in the future. Due to the role played by aggregate demand in heterodox theory long run economic growth determination, moreover, such a convergence can lead to a final disappearance of the treatment of long and short run evolution of modern economies as governed by almost completely independent factors, which is negatively judged by both *mainstream* [Solow, 1997] and heterodox authors [Garegnani, 1992, Petri, 2003].

FINAL REMARKS AND CONCLUSIONS

Present article analysed reasons according to which *mainstream* endogenous growth theorists elaboration can be fruitfully integrated with additional sources of endogenous growth presented in heterodox economists empirical and theoretical researches. It was in particular argued that *mainstream* economists admit a positive linkage between physical capital accumulation and both human capital accumulation and technical change. It has been, moreover, argued that the existence of negative linkage between income inequalities reductions and various sources of economic growth, assumed in most of *mainstream* literature, can be negated or disregarded, if different kinds of arguments, presented by heterodox authors, negating Say's law and/or neoclassical productive demand function theoretical and practical validity are accepted. After a careful presentation of heterodox arguments according to which physical capital can be held as endogenously determined by income distribution and aggregate demand, an introductory analysis of the results of possible integration of heterodox and mainstream endogenous growth source have been presented. Finally it was shortly underlined that such integration could possibly lead to greater engagement and convergence between heterodox and *mainstream* research programs.

BIBLIOGRAPHY

Aghion P., Howitt P., 1992, *A model of growth through creative destruction*, National Bureau of Economic Research, No. w3223, http://dx.doi.org/10.2307/2951599.

Aghion P., Howitt P., 2007, *Capital, innovation, and growth accounting*, „Oxford Review of Economic Policy", Vol. 23, No. 1, http://dx.doi.org/10. 1093/oxrep/grm007.

Bhaduri A. & Marglin S., 1990, *Unemployment and the real wage: the economic basis for contesting political ideologies*, „Cambridge Journal of Economics" No. 14.

Chandra R., Sandilands R.J., 2003, *Does investment cause growth? A test of an endogenous demand-driven theory of growth applied to India 1950–96* [in:] N. Salvadori, *Old and New Growth Theories: An Assessment*, Edward Elgar Publishing, Cheltenham UK.

Cohen A.J., Harcourt G.C., 2003, *Retrospectives: Whatever happened to the Cambridge capital theory controversies?*, „Journal of Economic Perspectives", Vol. 17, No. 1, http://dx.doi.org/10.1257/089533003321165010.

Funke M., Strulik H., 1998, *On endogenous growth with physical capital, human capital and product variety*, „European Economic Review" No. 44, http://dx.doi.org/10.1016/S0014-2921(98)00072-5.

Galbraith J.K., 2014, *Kapital for the Twenty-First Century?*, „Dissent Magazine", http://dx.doi.org/10.1353/dss.2014.0032.

Galor O., 2006, *Inequality and the process of development* [in:] *Economic growth and distribution: on the nature and causes of the wealth of nations*, N. Salvadori, Edward Elgar Publishing, Cheltenham (UK).

Galor O., Moav O., 2004, *From physical to human capital accumulation: Inequality and the process of development*, „The Review of Economic Studies", 71(4), http://dx.doi.org/10.1111/0034-6527.00312.

Garegnani P., 1962, *Il problema della domanda effettiva nello sviluppo economico italiano*, Svimez, Rome.

Garegnani P., 1966, *Switching of Techniques*, „Quarterly Journal of Economics", Vol. LXXX, No. 4, http://dx.doi.org/10.2307/1882915.

Garegnani P., 1978, *Notes on consumption, investment and effective demand: I*, „Cambridge Journal of Economics", No. 2.

Garegnani P., 1979a, *Notes on consumption, investment and effective demand: II*, „Cambridge Journal of Economics", No. 3.

Garegnani P., 1979b, *Valore e domanda effettiva. Keynes, la ripresa dell'economia classica e la critica ai marginalisti*, Einaudi Editore, Turin.

Garegnani P., 1983, *Two Routes to Effective Demand: Comment on Kregel* [in:] *Distribution, Effective Demand and International Economic Relations*, Kregel, Macmillan, London.

Garegnani P., 1992, *Some notes for an analysis of accumulation*, [in] *Beyond the steady state: a revival of growth theory*, Halevy, Laidman & Nell, Macmillan, London, http://dx.doi.org/10.1007/978-1-349-10950-0_3.

Garegnani P., 2011, *Capital in the Neoclassical Theory. Some Notes*, Nómadas. Revista Crítica de Ciencias Sociales y Jurídicas.

Garegnani P., Palumbo A., 1997, *Accumulation of Capital*, Università degli Studi Roma Tre, Dipartimento di Economia, Working Paper no. 2.

Han Z., Schefold B., 2006, *An empirical investigation of paradoxes: reswitching and reverse capital deepening in capital theory*, „Cambridge Journal of Economics", no. 30(5), p. 737-765, http://dx.doi.org/10.1093/cje/bei089.

Jabłoński Ł., 2011, *Kapitał ludzki w wybranych modelach wzrostu gospodarczego*, „Gospodarka Narodowa", nr (1-2).

Jabłoński Ł., 2012, *Kapitał ludzki a konwergencja gospodarcza*, Wydawnictwo CH Beck, Warszawa.

Kalecki M., 1956, *Theory of Economic Dynamics, an essay on cyclical and long-run changes in capitalist economy*, Routledge, London.

Keynes J.M., 1936, *The General Theory of Employment, Interest, and Money, Cambridge*, electronic version, The University of Adelaide Library Electronic Texts Collection.

Lavoie M., Stockhammer E., 2012, *Wage-led growth: Concept, theories and policies*, ILO, Geneva, http://dx.doi.org/10.1057/9781137357939.

Lucas R.E., 1988, *On the mechanics of economic development*, „Journal of Monetary Economics", no. 22(1), http://dx.doi.org/10.1016/0304-3932(88)90168-7.

Mankiw N.G., Romer D., Weil D.N., 1992, *A contribution to the empirics of economic growth*, (No. w3541), National Bureau of Economic Research, http://dx.doi.org/10.2307/2118477.

Onaran Ö., Galanis G., 2012, *Is Aggregate Demand Wage-Led or Profit-Led? National and Global Effects*, ILO publications, (No. 40), Geneva.

Onaran Ö., Stockhammer E., 2001a, *The effect of distribution on accumulation, capacity utilization and employment: testing the wage-led hypothesis for Turkey*, Economic Research Forum for the Arab Countries, Iran & Turkey.

Onran Ö., Stockhammer E., 2001b, *Two different export-oriented growth strategies under a wage-led accumulation regime: à la Turca and à la South Korea*, http://dx.doi.org/10.2139/ssrn.333781.

Pasinetti L.L., Scazzieri R., 1987, *Capital theory: paradoxes* [in:] *The New Palgrave: A Dictionary of Economics, First Edition*, Eatwell, Milgate, Newman, Palgrave Macmillan.

Petri F., 2003, *Should the theory of endogenous growth be based on Say's Law and the full employment of resources?* [in:] *The Theory of Economic Growth: a 'Classical' Perspective*, N. Salvadori (ed.), Edward Elgar Publishing, Celtenham (UK).

Petri F., 2011, *On the likelihood and relevance of reswitching and reverse capital deepening* [in:] *Keynes, Sraffa and the Criticism of Neoclassical Theory: Essays in Honour of Heinz Kurz*, N. Salvadori, Gehrke & Kurz, (Vol. 129), Routledge.

Petri F., 2013, *Investment depends on output even conceding traditional neoclassical capital theory: implications for Say's law* [in:] *Sraffa and the Reconstruction of Economic Theory: Volume Two: Aggregate Demand, Policy Analysis and Growth*, Levrero, Palumbo & Stirati, Palgrave Macmillan, London.

Piketty T., 2014, *Capital in the twenty-first century*, The Belknap Press of Harvard University Press, London, http://dx.doi.org/10.4159/9780674369542.

Piketty T., 2015, *The Economics of Inequality*, Harvard University Press, London, http://dx.doi.org/10.4159/9780674915565.

Romer P.M., 1986, *Increasing returns and long-run growth*, „The Journal of Political Economy", Vol. 94, No. 5, http://dx.doi.org/10.1086/261420.

Romer P.M., 1989, *Endogenous technological change*, National Bureau of Economic Research, No. w3210.

Romer P.M., 1990, *Human capital and growth: theory and evidence*, Carnegie-Rochester Conference Series on Public Policy (Vol. 32), North-Holland, http://dx.doi.org/10.1016/0167-2231(90)90028-J.

Romer P.M., 1994, *The origins of endogenous growth*, The journal of economic perspectives, p. 3-22, http://dx.doi.org/10.1257/jep.8.1.3.

Sala-i-Martin X., 1990, *Lecture notes on economic growth (I): Introduction to the literature and neoclassical models*, (No. w3563), National Bureau of Economic Research.

Samuelson P.A., 1966, *A summing up*, „The Quarterly Journal of Economics", No. 80(4), http://dx.doi.org/10.2307/1882916.

Schefold B., 2013, *Approximate surrogate production functions*, „Cambridge Journal of Economics", No. 37.

Setterfield M., 2014, *Neoclassical Growth Theory and Heterodox Growth Theory: Opportunities For (and Obstacles To) Greater Engagement*, „Eastern Economic Journal" No. 40(3), p. 365-386, http://dx.doi.org/10.1057/eej.2013.12.

Solow R.M., 1956, *A Contribution to the Theory of Economic Growth*, „The Quarterly Journal of Economics", Vol. 70, No. 1, http://dx.doi.org/10.2307/1884513.

Solow R.M., 1997, *Is there a core of usable macroeconomics we should all believe in?*, „American Economic Review", No. 87(2), p. 230–232.

Sraffa P., 1960, *Production of Commodities by Means of Commodities: Prelude to a critique of economic theory*, Cambridge University Press, Cambridge.

Valente R., 2014, *Redystrybucja dochodu i jej skutki długo- i krótkookresowe według teorii alternatywnych do paradygmatu neoklasycznego*, „Nierówności Społeczne a Wzrost Gospodarczy", z. 39, red. nauk. M.G. Woźniak, Wyd. UR, Rzeszów.

Valente R., 2016, *'Capital' accumulation, economic growth and income distribution: different theories and 20th and 21st century evidence*, „Nierówności Społeczne a Wzrost Gospodarczy", z. 46, red. nauk. M.G. Woźniak, Wyd. UR, Rzeszów.

Zambelli S., 2004, *The 40% neoclassical aggregate theory of production*, „Cambridge Journal of Economics" No. 28(1), p. 99-120, http://dx.doi.org/10.1093/cje/28.1.99.

Zeng J., 2003, *Reexamining the interaction between innovation and capital accumulation*, „Journal of Macroeconomics" No. 25(4), p. 541-560, http://dx.doi.org/10.1016/j.jmacro.2002.06.001.

Summary

Much of the recent *mainstream* literature on economic growth focuses on the role played by factors such as human capital, technical change and innovation, leaving somehow aside the crucial role which physical capital accumulation previously played in economic theory. As underlined in section one, a positive linkage between physical and human capital accumulation is however explicitly admitted by many *mainstream* endogenous economic growth theorists. They, however, accept either assumptions about physical capital accumulation presented in Solow model based on long run Say's law validity or accept neoclassical factor demand functions, based on marginal productivity. In both endogenous and exogenous *mainstream* growth models, income inequalities are thus assumed to positively affect physical capital accumulation and partially or fully affect human capital accumulation as well. Second section presented heterodox arguments contesting both the concept of monotonous productive factor demand functions and the long run validity of Say's law. It was, then, pointed out that in heterodox growth theory an independent, and much underestimated by *mainstream* authors, channel of economic growth endogenization can be found. Third section stressed that, once Keynesian long run physical capital accumulation path-dependency from short and long run evolution of aggregate demand and income distribution is considered, a strong positive relation between income inequalities reduction, technical change and both human and physical capital accumulation can be expected to follow. Integration of Keynesian and *mainstream* approaches was argued to could possibly increase the relevance of sources of endogenous growth present in both approaches and to reduce the inopportune long-short run divide still affecting economic theory.

Keywords: human capital, physical capital, aggregate demand, income inequalities, Keynesian theory

Ortodoksyjne i heterodoksyjne źródła endogenicznego wzrostu gospodarczego: związki między nimi a rola podziału dochodu

Streszczenie

Duża część współczesnej literatury głównego nurtu dotyczącej wzrostu gospodarczego, koncentruje się wokół roli kapitału ludzkiego, postępu technicznego oraz innowacji, zostawiając nieco na boku centralne znaczenie, które akumulacja kapitału fizycznego zajmowała w teorii ekonomicznej. Jak podkreślono w pierwszej części artykułu, istnienie pozytywnego związku pomiędzy akumulacją kapitału fizycznego i ludzkiego jest wyraźnie dopuszczane przez wielu teoretyków endogenicznego wzrostu gospodarczego głównego nurtu. Akceptują oni jednak założenia dotyczące akumulacji kapitału fizycznego przedstawione w modelu Solowa i oparte na długookresowym działaniu prawa Saya lub akceptują poprawność neoklasycznych krzywych popytu na czynniki wytwórcze, oparte na koncepcji krańcowej wydajności. W modelach głównego nurtu zarówno endogenicznego, jak i egzogenicznego wzrostu gospodarczego zakłada się więc, że nierówności dochodowe pozytywnie wpływają na akumulację kapitału fizycznego oraz, częściowo lub całościowo, również na akumulację kapitału ludzkiego. W drugiej części artykułu omówione zostały heterodoksyjne argumenty kwestionujące zarówno koncepcję monotonnych krzywych popytu na czynniki wytwórcze, jak i długookresową poprawność prawa Saya. Podkreślone zostało, że w heterodoksyjnej teorii wzrostu można znaleźć niezależny, a poważnie niedoceniony przez autorów głównego nurtu, kanał endogenizacji wzrostu gospodarczego. W trzeciej części uwypuklono, że wówczas, gdy bierze się pod uwagę keynesowską długookresową zależność ścieżkową akumulacji kapitału fizycznego od krótko- i długookresowej ewolucji popytu zagregowanego i podziału dochodu, można się spodziewać występowania silnej pozytywnej relacji pomiędzy redukcją nierówności dochodowych, postępem technicznym oraz akumulacją kapitału zarówno fizycznego, jak i ludzkiego. Stwierdzono dodatkowo, że integracja podejść keynesowskiego i głównego nurtu może zwiększyć znaczenie źródeł wzrostu endogenicznego obecnych w obydwu podejściach oraz zmniejszyć niekorzystny krótkookresowy i długookresowy podział wciąż obecny w teorii ekonomii.

Słowa kluczowe: kapitał ludzki, kapitał rzeczowy, popyt zagregowany, nierówności dochodowe, teoria Keynesowska

JEL: B22, E11, E12, E13, E21, E22, E24, E25, O30