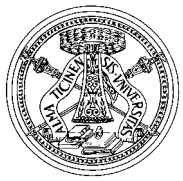
Basic income sustainability and productivity growth in cognitive capitalism: a first theoretical framework

Fumagalli, Andrea and Lucarelli, Stefano

Università di Pavia, Università Politecnica delle Marche

2006



Quaderni di Dipartimento

Basic Income Sustainability And Productivity Growth In Cognitive Capitalism: A First Theoretical Framework

Andrea Fumagalli
(University of Pavia)

Stefano Lucarelli
(University of Pavia)

183 (03-06)

Dipartimento di economia politica
e metodi quantitativi
Università degli studi di Pavia
Via San Felice, 5
I-27100 Pavia

Marzo 2006

BASIC INCOME SUSTAINABILITY AND PRODUCTIVITY GROWTH IN COGNITIVE CAPITALISM: A FIRST THEORETICAL FRAMEWORK

Andrea Fumagalli[♣] and Stefano Lucarelli[♠]

Abstract: This paper aims at proposing a first theoretical framework for studying the basic income sustainability. We consider the basic income not only as a tool of a policy to improve living standards and social well-being but, mostly, as the essential requisite to introduce a new stable compromise between capital and labour. Following the French *Regulation School* approach, we assert that the social compromise between capital and labour is founded on the redistribution of the productivity gains. Therefore we try to trace living standards and social well being problems back to their origins, i.e. the productivity growth. We think that describing the dynamics of productivity means understanding the main features of the contemporary capitalistic production. We first present a survey about BI in economic literature. We then focus on the socio-economic transformation of western countries and propose the term *cognitive capitalism* (CC) to describe the economic system after the Fordism paradigm crisis, highlighting the strong links between the exploitation of knowledge and the accumulation of surplus. Therefore we investigate the presence of a new type of Kaldor-Verdoorn law in *cognitive capitalism* (a virtuous circle among BI, increasing productivity - via knowledge and network externalities - output and employment). As a result, we first point out the ambiguous growth circle of the contemporary capitalism. Secondly we highlight that BI is compatible with the new way of accumulation, based on the exploitation of dynamic scale economies. BI increases productivity, through network (externalities) and learning processes and, at the same time, demand, *via* consumption level. This double result is not always guaranteed. It depends, on one side, on how much BI positively affects productivity, and the greater this probability, the lower the role played by intellectual property rights and the higher the diffusion of network economies (*general intellect* and social cooperation); on the other side, it depends on the way BI is financed. These results also depend on the assumption of closed economy, in which financial markets play no role at all.

Keywords: basic income, productivity, cognitive capitalism, crisis, Regulation School, Fordism, Post-fordism, knowledge, learning externalities, Kaldor-Verdoorn law, general intellect.

Jel Classification: I31, J24.

Email for correspondence: afuma@eco.unipv.it

[♣] Università di Pavia, Italy

[♠] Università Politecnica delle Marche, Italy

[1] From this point of view, as John Marangos suggested, we can define BI as Basic-Livable Income Guarantee. However our thesis is that the decent level of living standard depends on the capital-labour compromise.

Introduction

The problem of living standards and social well being in a developed economic system represents a point of great interest both in the USA and Europe: in the last years, the number of people living under the poverty line has been increasing. Meanwhile, the income polarization has been incessantly continuing. These effects are caused by the contemporary capitalism, which is based on a new accumulation paradigm (the flexible accumulation paradigm, see Fumagalli 2000). With the term basic income (BI) we intend the proposal of a universal and unconditional economic intervention, without discriminating against anyone, which would contribute to define, together with the juridical citizenship, the full economic and social status of citizens and their full enjoyment of the civil liberties. The BI would therefore be a regular and perpetual allowance, independent of the actual working activity, in order to guarantee a decent life to everybody. In this paper, we consider the BI not only as a tool of a policy to improve living standards and social well-being but, mostly, as the essential requisite to introduce a new stable compromise between capital and labour[1]. Following the French *Regulation School* approach, we assert that the social compromise between capital and labour is founded on the redistribution of the productivity gains (Aglietta 1979, 1997, Lipietz 1986, Boyer 2004 a, 2004 b). Therefore we try to trace living standards and social well being problems back to their origins, i.e. the productivity growth. We think that describing the dynamics of productivity means understanding the main features of the contemporary capitalistic production.

The recent European debate about the socio-economic transformation of western countries has been marked by the consciousness of the Fordism paradigm crisis. Many social scientists have introduced quite a simplistic term to define this new age of capitalism: Post-fordism. This term is clearly present in many research areas such as sociology, economics, political science, urban studies. «The term Post-fordism refers to a social model whose way of production is no longer dominated by hierarchically organized forms of communication or by the negotiation of wealth distribution carried out by representatives of collective bodies and supervised by the State. Contrariwise, the Post-fordist model is characterized by forms of flexible accumulation that can integrate and connect highly diversified modes, times and places of production» (Zanini, Fadini 2001). We propose the term *cognitive capitalism* (CC) to highlight the strong links between the exploitation of knowledge and the accumulation of surplus. First of all, the heart of the accumulation process has been shifting from material to immaterial commodities, following a new type of international division of labour, based on knowledge (cognitive division of labour). Consequently, due to the internationalization of production, the diffusion of the Information and Communication Technologies (Ict) and the fast developments in the transportation of commodities, manufacturing activities have been shifting to developing countries, whereas financial, technological, supervising, logistical and control activities have been concentrating in the highly industrialized countries (North America, Europe, Japan and Australia). Secondly, knowledge represents the key variable to describe the Post-fordist paradigm[2]. It follows that nowadays we have moved from the monetary scheme of production M-C-M' (money-commodities-money), that describes the industrial capitalism, to a new one, characterized by the production of money by means of knowledge [M-C(K)-M'].

[2] As Virno notes, in the Fordist factory the activity of labour is mute and production is a silent chain. «In the Post-fordist metropolis, on the other hand, the material labouring process can be empirically described as a complex group of linguistic acts, a sequence of assertions, and a symbolic interaction. This is because labour activity is now performed alongside the system of machines, with regulating, surveillance and coordinating functions; but also because the process of production uses knowledge, information, culture and social relations as its "raw materials"» (Zanini, Fadini 2001).

Tab. 1: Historical evolution of economic systems			
Pre-capitalistic stage	Mercantilism	Production of commodities by means of money	C - M – C
Capitalistic stage	Industrial capitalism: pre-fordism and Fordism	Production of money by means of commodities	M - C – M'
	Post-fordist or Cognitive capitalism	Production of money by means of knowledge	M – C(K) - M'

In this paper we defend the sustainability of BI in cognitive capitalism. This is the first step of a broader research programme aiming to describe:

- first, the relationship between the introduction of a basic income (BI) and the level of labour productivity;
- second, how a virtuous circle (increase in living standards → increase of productivity → increase in output) based on learning and dynamic scale economies can provide the sustainability of the same BI at governmental level. We propose to call it the *new Kaldor-Verdoorn law*[3].

The paper starts with a brief survey about BI in economic literature in order to highlight an important theoretical absence that invalidates the analysis: the role played by dynamic scale economies is not taken into account by this literature. The second section illustrates the determinants of the productivity in CC. Here, knowledge (K) is considered as a commodity[4], albeit with specific characteristics. A point needs to be made clear: knowledge is an immaterial commodity and the derived production is essentially an immaterial production. Because of its immateriality, knowledge is not like a physical commodity, which is self-defined in term of weight, size and other quantitative parameters. It's difficult to know where knowledge is: it could be everywhere. The point is that knowledge is pervasive. It is neither simply an input (as it is considered in economic textbooks, where knowledge is assimilated to information), nor a consumption good, which can be described with the traditional tools of market analysis (as it is in the textbooks of industrial organization). On the contrary, knowledge is more concatenated to technology: it is a production tool which is generated through investment and accumulation activities. The third section presents a first attempt of formalization of CC in a dynamic context.

Briefly, the aim of this paper is to present a simple theoretical framework of CC to demonstrate that BI, far from being a utopian proposal, is a measure of economic intervention compatible with the social reality of the flexible accumulation and therefore more realistic today than it was in the Fordist period.

1. Basic Income in economic literature: a survey[5]

In the last 15-20 years, the debate concerning the necessity of introducing a universal and unconditional income has been addressed by many scholars. Not surprisingly at all, such a debate was brought to light when, as a result of the failure of the Fordist paradigm, the keynesian model of welfare state began to be dismantled. The definitions of a universal BI, as well as the ways of distributing it, proposed by the scholars differ significantly. Three are the theoretical approaches:

[3] The Kaldor-Verdoorn Law postulates the existence of a significant positive relationship between the growth-rates of labour productivity and output, at least in manufacturing; see Verdoorn 1949, reprinted in English as chapter 2 of Mc Combie, Pugno and Soro (edited by) 2002. It was Kaldor, who coined the term 'Verdoorn's Law' and ensured that it received general recognition. It was one of the two empirical regularities by wich he tried to explain, in his lecture held in Cambridge on 2 November 1966, the causes of the British slow rate of economic growth; see Kaldor 1966; see also Kaldor 1975.

[4] That is why we write C(K).

[5] The author of this paragraph is Jacopo Mazza, Università di Lugano-USI.

- the first is the one proposed by classical liberals like Milton Friedman. Such an approach is based upon the idea of "income negative tax". From this point of view, the functions of the state should be reduced to the minimum, in the sense that redistributive policies should be implemented automatically, considering a negative progressive tax. In such a case, all those who are under the threshold of relative poverty, on the one side, should not pay taxes, on the other, the State should pay the difference necessary to reach the threshold of relative poverty. This is carried out along with the dismantling of the welfare system. That is, everybody has to pay a fee to have access to all public services (school, health, etc …), with the sole exception of justice and defence.
- The second theoretical approach moves from the acknowledgment both of the failure of currently existing welfare systems and of the fact that the processes of flexibilisation of work might entail the existence of the so-called working poor. As a result, it becomes necessary to provide a continuity of income to persons whenever their labour power cannot be sold or the income obtained for their contribution in the labour market is too low. In this case, rather than speaking of universal BI, we'd better speak of guaranteed income. With such an expression, the authors refer to the distribution of an income only to poor people who, by definition, do not have any income. Such a distribution is independent of any activity undertaken, does not require any offset on the part of those who receive it, and lasts until the recipient remains under the threshold of poverty. By its very definition, this is an unconditional but not universal economic intervention. A softer version is named guaranteed wage. (Delors Commission 1990, Supiot Report 2003) Differently from the guaranteed income, the guaranteed wage is provided for a limited period of time to those who are unemployed, although still unconditionally.
- The third approach refers to the idea that a person's income must be universal, unconditional, and unlimited in time. Such an orientation lies at the heart of researches promoted by Bien (Basic Income European Network) in Europe and by Usbig (United States Basic Income Guarantee) in North America. The most influential scholar approaching the matter in this way is Philippe Van Parijs (1992, 1996, 2000, 2002). According to this perspective, it is possible to add economic reasons to the social and ethical ones, related to social equality and to the full enjoyment of citizenship as a result of the processes of transformation of the paradigm of accumulation and labour organization which characterized the economic system in the last 25 years. Building upon this latter body of literature, we will try to show that the introduction of a universal BI is worth a high consideration as a viable redistributive policy able to deal with the challenge posed by the new paradigm of flexible accumulation (Gorz 1997, Fumagalli 2000).

In addition to the above-revised theoretical approaches, the literature offers also a limited range of empirical studies looking at the impact of BI on output and employment. Most of these analyses dealt with the fields of ethics and political science rather than with economics. Nevertheless, the economic literature has investigated the extent to which BI might be considered as a tool against poverty and the problems of its implementation in the fiscal structure (Atkinson 1995 b; Atkinson e Morgensen 1993). As far as the analysis of the impact of BI on labour market is concerned, five articles are considered here (Bowles 1992; Van der Linden 1997; Kesenne 1993; Serati 2001; Groot 1999).

In Bowles's work (Bowles, 1992), it is shown that, in the presence of asymmetric information and efficiency wages, the introduction of a BI might increase both the employment rate and the efficiency of the labour market. In this context, if BI substitutes unemployment grants, the "reserved wage" of workers will tend to decrease, with negative effects on the market, and therefore BI should be lower than the relative poverty line. The intensity of this mechanism is negatively correlated to the amount of the BI, given a certain level of conflict between firms and workers. Therefore, Bowles suggests that BI should not be higher than the poverty line.

Van der Linden (Van der Linden 1997) analyses the different schemes of BI (with different impact) in a context characterized by a monopolistic trade union and perfect information. Unemployment rate in equilibrium is negatively correlated with a "partial" BI and is proved to be lower than what it'd be in presence of unemployment benefits. If the BI level is too high and universal (with risk-averse workers), the bargaining power of the monopolistic trade union will lead to an increase of wages with negative impact on employment.

Also Kesenne (Kesenne 1993), through a macroeconomic simulation process, concludes that a BI, which substitutes every already existing unemployment benefit, can generate a *crowding out effect* in the labour market if its level is too high. This effect is due both to the existence of an "income effect", which reduces labour supply, and to the increase of fiscal pressure.

A negative effect on labour supply has been verified also by Groot (Groot 1999), especially if the amount of BI is too high. Groot considers a dual labour market with efficiency wages. In this case, BI is compatible with a lower unemployment rate but with lower income for the unemployed (if BI, as usual, substitutes every unemployment benefits and it is of modest entity), higher wages and less income polarization.

Last but not least, the model presented by Serati (Serati 2001), based on the model by Layard (Layard, Nickel, Jackman 1991), shows that the introduction of a BI has positive results as far as employment level is considered; Serati introduces BI in two stages: first, as an individual sum of money given to each citizen; second, as a process of financing the BI, through the elimination of unemployment benefits and an increase in fiscal pressure. The results are the following: the introduction of BI is neutral on the labour market, with no significant changes in the labour supply. Instead, the elimination of unemployment benefits implies a positive and permanent answer on employment, whereas the increase of fiscal pressure has a negative, for the first three years, but irrelevant in the long run, impact on employment. Hence, the total result is positive.

Though varied, this literature presents some homogenous aspects: the Keynesian perspective (existence of unemployment), the presence of efficiency wages and rigidity in labour market, imperfect and asymmetric information (with the only exception of Van der Linden), and, overall decreasing returns of scale. This latter hypothesis is the more relevant. The two main results are:

1. BI has overall positive effects only if not too high or just below the threshold of relative poverty;
2. BI plays a substitutive role for unemployment benefits;

These results are valid only in presence of decreasing returns of scale.

In our opinion, it is necessary to consider the role played by dynamic scale economics, in conjunction with information technology and knowledge process in areas characterised by the widespread presence of material ad immaterial industrial and service activities. To test the presence of a new type of Kaldor-Verdoorn law in CC, it is reasonable to assume increasing returns, based on learning approaches and network production. In this context it is possible to hypothesize a virtuous circle among BI, increasing productivity (via knowledge and network externalities), output and employment. It is in this direction that we consider the broader and more universalistic definition of BI.

2. The determinants of productivity in cognitive capitalism

Knowledge represents the core for understanding the recent structural changes: we live in a new growth regime driven by information and communication technology (Boyer 2004 b). We propose to call it CC. In CC, the determinants of productivity change again: in a context in which knowledge is the basis of accumulation, it is necessary to analyze how the exchange of knowledge and its diffusion affect the productivity dynamics and which kind of returns of scale are then generated. If knowledge is widespread, the real issue is to measure its *intensity*, but this turns out to

be pretty difficult to do. In the first instance, we suggest three possible parameters that are apt to do so:

- the quality of the interpretation and of the learning process;
- the level of propagation and diffusion of the knowledge itself;
- the existing type of property rules.

In other words, what we need is to evaluate:

- the efficacy (*opportunity*) of the knowledge, interpreting the existing needs, to be transposed in an economic value (v_1);
- the deriving multiplication (*cumulativeness*) of uses as long as the knowledge spreads into the economic system (v_2);
- the appropriation (*appropriability*) of the resulting products, descending from the use of the knowledge (v_3)[6].

Into a single productive context or in a *filiere* context, the returns of knowledge are calculated summing these three variables: $v_k = (v_1) + (v_2) + (v_3)$.
The idea of opportunity recalls investments strategies, which the investor decides to pursue on the basis of some fixed objectives. Independently of the results and of the normal degree of uncertainty, the outcome is an increase of production and, much likely, an increase of productivity. The degree of *cumulativeness* of knowledge and, consequently, its diffusion speed, due to the fact that knowledge is not exhausted by consumption, necessarily implies increasing returns of scale. Unlike the situation in Fordism, this diffusion doesn't depend on technological transfers (that is to say on a machinery meant as physical stock), but on the extent of the relational *flows* generated by the immaterial process. In fact, the *fluid propagation* generates the increasing returns connected with the use of knowledge. Those returns don't become, but in a minimum quantity, physical returns but, depending on the degree of *appropriability*, are transformed mainly in monetary returns.

In this context, the hypothesis of decreasing returns of scale doesn't make sense. The advent of the capitalistic system has put into evidence, since its very origins, an outstanding increment of labour productivity[7]. This growth was due primarily to technological and organizational innovations driven by investments. In the initial phase of capitalism, analyzed by Smith and the classical economists, the subdivision of labour constituted the principal force driving productivity, and therefore accumulation and growth. In Fordist capitalism, the increasing mechanization with the consequent automation of production was the origin of the most astonishing increase of productivity of the whole human history. In both cases, the technological transformations and the organizational innovations had to deal with the production of concrete goods: in the nineteenth century's capitalism, the leading sectors were the textile industry and the newborn industries of steal and iron, with the first kinds of instrumental mechanics and consumption goods. In the Fordism case, the chemistry industry, the industry of new materials concerning investment and intermediate commodities, the industry of durable goods and the car and electronic industries on the side of consumption goods, represented the core production of the manufacturing sector: all these sectors were allowing for maximum exploitation of static scale economies. Is it meaningful to suppose the existence of decreasing returns of scale in high labour intensity productions? With such expression we want to underline the fact that as the employment of labour increases – *ceteris paribus*, particularly the techno-organizational conditions – the returns of the last added unit of labour, that is to say the marginal utility, tends to be relatively inferior. This hypothesis originates from the

[6] For a further reading on this theme see among others: Nelson and Winter, *An Evolutionary Theory of technical Change*, in Dosi et alii 1988 and Fumagalli 1995, especially chap. 3.
[7] Cfr. J. Maddison 2002.

analysis of agricultural production and from the rent theory in Ricardo. In Ricardo, as long as we begin to cultivate new lands farther from the fertile plain, where the biggest quantity of water is concentrated, the marginal fertility of new lands and the rents associated with it will be always decreasing. The neoclassical theory of production, within the general equilibrium approach, transposed such hypothesis to the analysis of industrial production when using labour and capital as productive factors. For what concerns labour, such a transposition was based on the assumption, almost never analyzed in a critical way (Donzelli 1986), that, as the effort increases, that is to say when the labour time increases, the returns of the productivity factor labour tends to decrease: and that seems reasonable. After substituting, with a doubtful and unconvincing operation, the quantity of labour for the time of labour it has been affirmed that, even when increasing the number of workers, the marginal productivity of labour increases with decreasing rates. This assumption was hardly discussed but became so dogmatic that, almost magically, it happened to turn into a law, or postulate: the law of decreasing marginal returns of scale of productive factors or law of variable proportions[8]. Such a law has no analytical nor empirical ground. In fact, if it is not at all granted that the newly hired worker (*the marginal worker*) has a productivity undoubtedly inferior if compared with his colleagues, it is even harder to understand why such a law would be successfully applied to machinery. In order to better handle the question, it is necessary to start from the realization that what makes the returns of the productive factor constant, or at most increasing, is the content of knowledge and of transmission of knowledge incorporated in the productive factor itself.
In the specialized task of an experienced worker, the productivity is influenced positively by the level of experience, measurable in time units (i.e. years of work), and is negatively influenced by the accumulation of tiredness. In that context, we can presuppose that the newly hired worker, who is thought to be the youngest, is provided with less "experience", or rather, with less knowledge. The hypothesis of decreasing marginal returns when the number of workers increases sounds therefore reasonable , particularly if the newly hired employee has less working experience.

In the case of the Tayloristic *mass worker*, labour productivity essentially depends on the intensity degree and on the "corporal" exploitation level of each worker connected with the automation process of machines. It is into the machines, in fact, and not into labour that knowledge explicits its entire power. In Tayloristic labour is the degree of intensity of machines and plants utilization that guarantees increasing levels of productivity. But since those increments of productivity linked to the always more automatic employment of machines can't exist without the support of wage-earning workers, that productivity is directly commensurate with the supply of human labour. This is the basis of the peculiar force of Taylorism, that differentiate it from the handmade capitalism: his capacity of triggering increasing returns of scale. Such increasing returns of scale stem from the development of static economies of scale, or rather from the dimensional economies. From there, it is straightforward to conclude that as the number and dimension of plants increase, the productivity per unit of labour, due to the rationalization of machine-driven labour, tends to increase up to a maximum limit.

[8] This is a non demonstrated postulate: almost every microeconomics manual uses it in order to explain the theory of production. As Luigi Pasinetti has recently recalled, «economists of the latter half of the 19th century had the intuition to grasp the ingenious potential of the marginal principle underlying Ricardo's theory of rent and conceived the idea of widening (or, rather, as is said more persuasively, of "generalising") its application. That set of economic theories that were proposed in the late 19th century and were indicated as a "marginal revolution" focussed precisely on the generalised application of the "marginal principle". This was introduced first to account for consumer behaviour (the theory of marginal utility); then it was applied, by extension, to the *whole* theory of production and distribution (and not only to land and rent). This development is no doubt an interesting phenomenon, from the view point of the history of economic thought. It is a fact that the use of the marginal principle in the theory of production and distribution (later known as "neoclassical" theory) did not come about as a result of new observations of reality. It came about by analogy, as a convenient, indeed as an elegant, aesthetically attractive, extension of Ricardo's principle of diminishing returns (originally concerning land) to all the resources in existence» (Pasinetti 2000).

In the standard neoclassical theory, nowadays still the dominant fundament of microeconomics, the production activity is described with the *production function*. This is an abstract concept that defines production in static terms and with decreasing returns of scale whichever productivity factor is taken into account[9]. In algebraic terms it follows that the marginal productivity curve is always negatively inclined. It is a paradoxical result, both from the theoretical and the empirical point of view:

- on the theoretical side, it is rejected the intrinsically dynamic nature of the production activity, resulting from the investment choices. In other terms, it is rejected the existence of an accumulation process which, instead, is the key characteristic of the capitalistic accumulation system. It's not by chance, in fact, that the investment is considered only in macroeconomic terms and it disappears from the microeconomic theory of production[10]. Strictly linked to this *modus pensandi* is the hypothesis of externality of technological progress, as though the study of the innovation activity was not an economically relevant question;
- on the empirical side, instead, it is easy to observe that, especially in the Fordist-tayloristic period, the productivity of labour tended to increase exponentially, mostly right after the second world war, and only from the second half of the Sixties it began to show decreasing rates of growth. It's a kind of dynamics that has nothing to do with the hypothesis of decreasing returns of the productive factors.

In CC, two new kinds of economies of scale are generated, which have a deep positive impact on the nature of production returns and therefore on productivity. On one hand, we have dynamic economies of learning (*learning by doing* and *learning by using*); on the other hand, new spatial economies, related to the transmission and speed of diffusion of knowledge, are developing. In the first case, we are moving inevitably in a dynamic context and consequently the concept of production function appears inadequate. In the second case, instead, it becomes necessary to redefine the spatial sphere of the accumulation process and to rethink the concept of externality [11].

In the CC, knowledge is not *produced* as a material commodity, but is *replicated*. The *replicability* of knowledge and its diffuse relational nature entail, by definition, necessarily increasing marginal returns. Those returns are constrained by the royalties on intellectual property. The bigger, in fact, the degree of *appropriability* of knowledge, being equal its efficacy, the smaller its capacity of diffusion and therefore the capacity of generating positive effects on the associated productivity.

It is now necessary to underline that the productivity embedded in the knowledge exchange can't be assimilated to material productivity. In CC, when we talk about knowledge productivity, we refer to the social productivity of *general intellect*[12], whose intensity varies along with the distribution, within the codified knowledge, of the total amount of mute knowledge. We can

[9] In algebraic terms it is hypothesized that the first derivative of the production function is positive, whilst the second derivative is negative: $Y = f(L, K, \ldots.)$ with $Y' > 0$ and $Y'' < 0$. Consider also that the staticity of the production function is one of the bases of many growth theories.

[10] On the link between investment, accumulation and production see Fumagalli 1995, chap. 2.

[11] On this concept, see Moulier-Boutang 2003 and Fumagalli 2005.

[12] *General intellect* is a crucial term in the debate about Post-fordism. It appears in Marx's *Fragment on Machines*, a section of the *Grundrisse*. This is an attractive metaphor for referring to the knowledge that makes up the epicenter of social production and preordains all areas of life (see Virno in Zanini, Fadini 2001): «The development of fixed capital indicates to what degree general social knowledge has become a direct force of production, and to what degree, hence, the conditions of the process of social life itself have come under the control of the *general intellect* and been transformed in accordance with it» (Marx 1973). The interpretation of Marx's *Fragment* gave rise to many considerations in the so called *Operaist* approach (see principally Panzieri 1964, Tronti 1971[2], Negri 1979). In the last years, this approach led to investigating the capital-language *nexus.* This *nexus* is considered as the real turning point of the socio-economic system in the Post-fordism (see Zanini, Fadini 2001). The *general intellect* social productivity is defined as *bioeconomic productivity* by Fumagalli 2002.

reasonably think that the bigger is the share of codified knowledge on the total amount of available knowledge dedicated to the accumulation activity, the higher is the achievable level of social productivity. Yet, since in the knowledge life cycle the codified knowledge itself descends from the mute knowledge (which is non-transmittable knowledge), there is a trade-off between the social productivity of the *general intellect* and the mute knowledge itself.

In the second place, the productivity of knowledge can not be associated with the classical mechanical input/output model any longer, as it was in the traditional concept of the production function (Moulier Boutang 2003, see Tab. 2). In such a context, characterized by uncertainty and outlying behaviours, with respect to hypothesis of maximizing behaviours (instrumental rationality), the procedural rationality hypothesis gains higher relevance. As in the case of behaviours concerning the functioning of financial markets, the linguistic-communicative mechanisms are central: they determine the *rules,* which are defined on the basis of imitative and dominant behaviours, that can better explain the evolution of the productivity of knowledge and define the prevalence of some scientifically determined trajectories rather than others[13]. The non measurability of the productivity of knowledge through the traditional quantitative methods founded upon the output calculation, leads to devise a theoretical model, still to be defined, that refers to the biological models of evolutionary dynamics, in which the dynamic learning processes constitute the key factors. A first step can be building a taxonomy of knowledge (Nelson, Romer 1998, Moulier-Boutang 2003), splitting the cognitive inputs in four categories: *hardware* (machinery), *software* (computer processes), *webware* (attention and brain activities), *netware* (networks stimulated by computer processes and brain activities).

Tab. 2 Commodities, externalities and returns in a cognitive economic system
(inspired by Moulier-Boutang 2003)

COMMODITIES	DOMINANT INPUT	DESPCRIPTION	DOMINANT POSITIVE EXTERNALITIES	RETURNS
Material commodities	Computer, *hardware*	Physical capital	Indivisibility externalities	Decreasing
Data processing commodities	*Software*	Human capital	Learning externalities	Constant
Living commodities and knowledge commodities	Attention and brain activities, *webware*	Individual living labour	Learning externalities	Constant or increasing
Collective commodities and knowledge commodities	*Netware*	Cognitive and cooperative division, collective living labour	Netware externalities	Increasing

Therefore, the Basic-Livable Income Guarantee can be considered as a social salary: in the CC the new form of wage earning is not the traditional remuneration measured on the working time, as a production input isolated from the capital; as Moulier-Boutang wrote, in a cognitive economic system, *hardware, software, webware and netware* are the inputs of all goods and services. If we try to identify the retribution rules for each input (see Tab. 3), we can conclude that:
in an immaterial production economic system (CC), productivity gains are no more distributed, welfare state support to internal demand decreases and wages are no more connected to employment. Given the CC paradigm, BI could represent the remuneration for the social productivity that the four new input combinations generate: it is necessary that the retributive dynamics (subordinate or self employment) becomes a social issue to be regulated on the level of the

[13] We derivate the concept of scientific trajectories from Kuhn 1962.

social distribution of the income. In other words, it is necessary an income ruled by a statute and linked to the belonging to a territory.

Tab.3 Income distribution for the four input categories in the material and cognitive economic systems

INPUT	MATERIAL ECONOMIC SYSTEM (income distribution rules)	COGNITIVE ECONOMIC SYSTEM (income distribution rules)
HW production of fixed capital by means of living labour	Individual wage as marginal productivity	Cooperative wage and fixed capital protection
SW production of fixed labour by means of living labour and fixed capital	Wage as labour force reproduction	Fixed labour protection (information)
WW production of living labour by means of living labour	Technical progress income Patents and copyrights	Remuneration or financing of *living* and learning innovations
NW Production of living cooperation by means of fixed capital, fixed labour and living labour	Organization and transaction costs financed by means of subsidies	Remuneration and financing of interactivity and global coordination (HW, SW, WW)

3. A framework for cognitive capitalism in a dynamic context

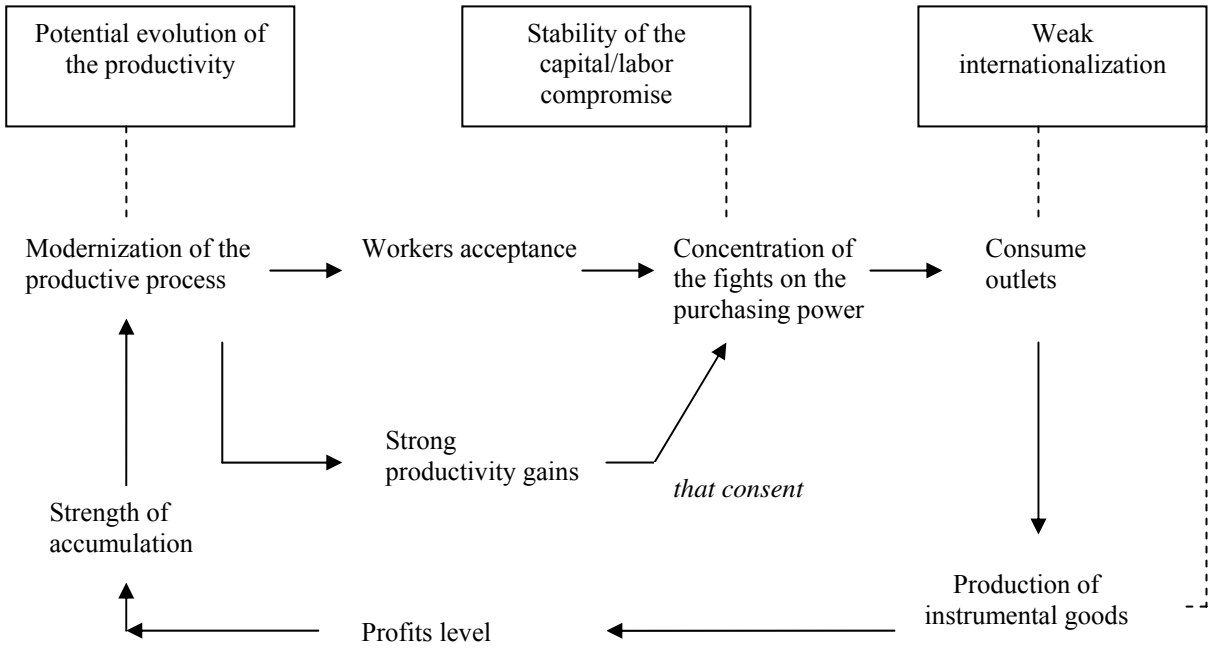
3.1 A scheme of Fordist capitalism

In this paragraph we shortly describe the *Regulation School* analysis of the Fordism, i.e. the model of capitalist development that was dominant after the Second World War. The Regulation approach studied Fordism as an accumulation regime (Aglietta 1976, Boyer 2004 a). This way of production was certainly not a global model. Its realization varied in different western nations according to their institutions and the impact of external shocks. Nonetheless it was characterized, schematically, by

- a Taylorist division of work between creative work, skilled production, and unskilled production, all governed by hierarchical procedures;
- a system of accumulation based on the redistribution of the gains of productivity to the workers, in a way that would guarantee the growth of effective demand;
- mass production of standardized consumer durables;
- a regulation tool that guarantees this redistribution through social legislation, collective agreements and welfare states.

In a Fordist context, the evolution of productivity depends on the evolution of the techniques adopted in the production, on the investment flow and on the presence of static scale economies. The investment flow is a function of the growth rate of consumption. The latter depends on the wages mass. The real wage, indexed on productivity gains, is the most relevant variable.

Figure 1: The virtuous circle of the Fordist growth (Boyer 2004 a)



The dynamic equilibrium is guaranteed by the increase of productivity, as a consequence of the exploitation of static (size) scale economies, through incremental innovative activities, driven by investments, and by the increase in real wages, as a result of the capital-labour Fordist compromise. The result is a sort of identity between mass production and mass consumption, whose dynamic is partially regulated by the intervention of the State, with incentives either to production and to indirect and direct consumption (Keynesian deficit spending and welfare policies). It follows that growth in Fordism looks like a two-stroke engine: initially productivity triggers growth, afterwards growth spurs productivity. This is an explosive process, but fundamentally unbalanced, if demand dynamics is not able to be in line with output dynamics, through the facilitation of commodities appreciation (Boyer 2004 a). From a historical point of view, Fordism goes through its crisis during the 70s: the soaring prices of raw materials, the oil crisis and the monetary storm together with the fixed exchange rate of the dollar did define a new framework for the restructuring of the global market.[14] The Regulation approach model (Boyer 2004 a) allows to determine technological and institutional conditions that guarantee the Fordist virtuous circle: an employment growth, a relative stabilization of the economic fluctuations and the absence of the decline of share profits. For employment to increase, it is needed that the autonomous components of the demand (i.e. consumption and investment) have a dynamics faster than the labour-savings trends due to technical progress. To make the growth path stable, the indexing degree of wages with regard to productivity, must be comprised between two limits depending on technique and demand. A good profit dynamics presupposes that the indexing degree of wages is smaller than a limit depending on technical and demand-related parameters.

[14] In Italy, between 1978 and 1979, the so-called *fifth generation of workers*, who had grown up in large cities during the construction of a welfare state, entered the *large factory*, the brain of the Fordist organization of production. The experiences of the *new employees* were radically different from those of the previous generations of individually unskilled workers. «They rise up against both the wage 'structure', its 'form' and the necessity to work for the whole duration of one's life itself, to receive an income rather than a salary. The subjectivity expressed by this new labour force certainly failed to undermine the factory regime overall. If anything, it made it more viable and eased the restructuring move towards flexibility» (Zanini, Fadini 2001). In this context the proposal of a basic income began to spread in the so called 1977 Italian political movement.

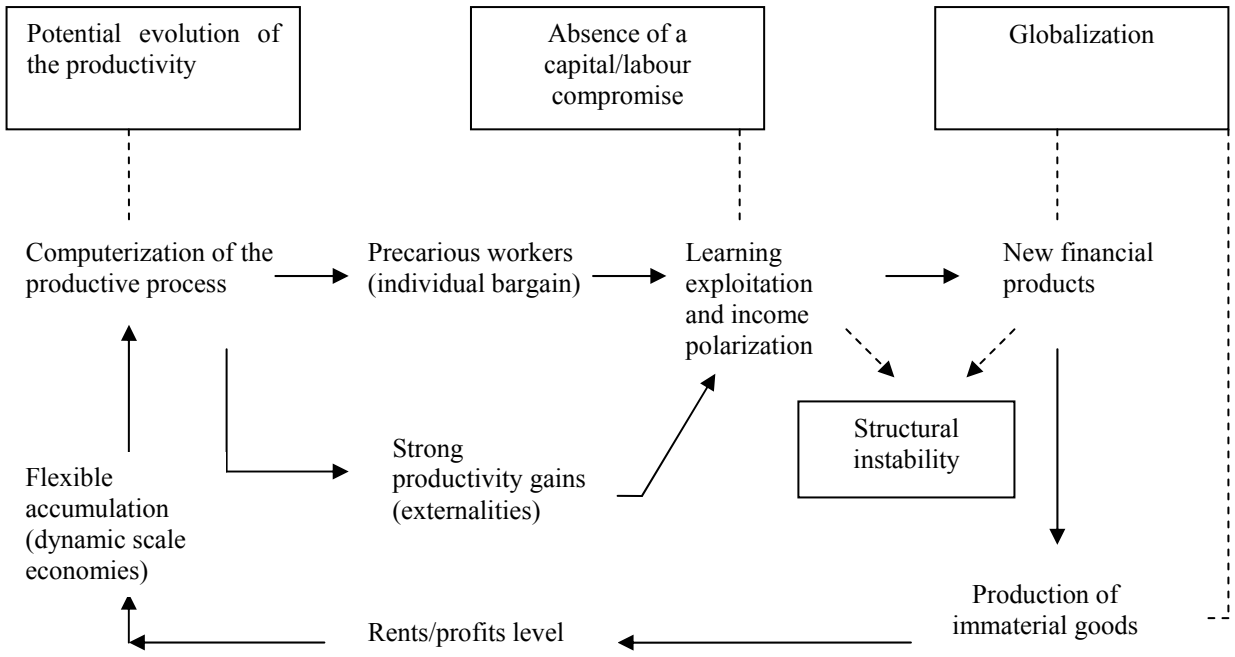
3.2 A scheme of cognitive capitalism

From our previous discussion it is clear that CC differs from Fordist-industrial capitalism in two main aspects:

- the origin of productivity gains, that are now based on learning processes and externality economies. Therefore, we are in presence of a new type of Kaldor-Verdoorn law, with increasing return effects and absence of scarcity, since knowledge, as the key variable of the accumulation activity, is a not a rival but a cumulative commodity, with the only constraint of intellectual property rights;
- the capital-labour compromise, based on the connection between productivity gains and real wage dynamics, is now declining, with effects on polarization of income distribution. The valorisation of production is at the moment compensated by the role played by financial markets as multiplier of the aggregate demand and by globalization processes (delocalization, outsourcing, lower labour costs). In this context, the balancing of the system relies on one side on the growth of financial markets and the distributions of the generated surplus, on the other side on a high level of growth in the new industrialized countries, at the core of outsourcing and delocalization processes.

These two conditions cannot be considered as structural. It means that, in this context, CC seems unstable. Figure 2 describes the ambiguous circle of CC. The absence of a social compromise determines the ambiguity of this finance-driven growth. As Boyer says, «the concomitant loss of the collective bargaining power of employees made them accept forms of payment that were increasingly dependent on the performance of the company, particularly with respect to financial earnings» (Boyer 2004 b, p. 49)[15].

Figure 2: The ambiguous circle of cognitive capitalism



[15] Above all Boyer considers the United States in the 90s: «it is the country where stock market wealth is significant, compared to available income flows, and where the assets of large companies can be easily traded in a highly liquid market».

In order to build up a theoretical framework in a deeper way, we can start with a description of the supply side, aimed to highlight the main features of the accumulation and production variables.

We consider a simple Keynesian dynamic model[16]. The reference scheme aims at underlining the role played by the changes in the productive conditions.

Let us assume a dynamic context during two periods t and t+1. We assume that the variation of production ΔY depends on the dynamics of the productivity in the middle-short term, $\Delta\pi$.

According to the Keynesian school this dynamics depends on the nature of the investment I.

$I(t) \rightarrow \Delta\pi \rightarrow \Delta Y$

Let us suppose that the investment activity depends on two variables: 1) the propensity of entrepreneurs to invest, according to their expectations (σ) and 2) the performance of the economy in the past period, approximately represented by the dynamics of GNP (Y_{t-1}). We can write:

$I(t) = f(\sigma, Y_{t-1}) = \sigma\, Y_{t-1}$

The investments devoted to production comprise investments in the various technologies available in the system.

The economic process is always generated by the social system – each state being associated to an economic process with specific features. Approximately the specific features for a CC are the ability to enlarge the knowledge basis, *k,* and the network and learning economies, λ. In other words, we define *k* as generation of knowledge, and λ as the spatial diffusion of knowledge, through the learning process. They are the basic units of the social structure and the main causes of the cognitive accumulation process. Knowledge processes and network-learning economies become the direct determinants of the productivity variation.

Consequently we consider a production asset in a period t, where the productivity improves as the generation of knowledge and the network-learning economies increase, as a result of the investment activity.

$I(t) \rightarrow \Delta\kappa^{+},\ \Delta\lambda^{+} \rightarrow \Delta\pi \rightarrow \Delta Y$

$\Delta\lambda$ depends on the degree of *cumulativeness*, *opportunity* and *appropriability*; $\Delta\kappa$ depends on the degree of the income level and the positive externalities.

From a systemic perspective an innovation is a change in the economic process and it is caused by the investment activity, according to how much investment is devoted to the already existing technology or to new technologies. Since we are focusing on the role played by knowledge as the key factor to increase systemic productivity trends, the share of innovation in the different technologies can be measured by the level of implemented knowledge In other words, a higher level of knowledge corresponds in terms of its generation (κ) and diffusion (λ), to more innovative technologies,

Changes in the ability to generate new knowledge as basic condition for the spread of new technologies ($\Delta\kappa$) depend on the characteristics of the environment in which R&D activities are organized. We can imagine that this environment is positively influenced by the level of income (Y) and by a set of variables, like education level, macroeconomic and political stability, a fair wealth distribution, the existence of a good infrastructural system, both in material and immaterial activities, which we define as positive externalities (E):

[16] As references, see the post-Keynesian literature, starting from Kaldor 1984. See Dosi 1988, Boyer 1988a, Lipietz 1986. See also Fumagalli 1995. Let us consider that all these contributions refer to a Fordist economy.

$\Delta\kappa = f(Y^+, E^+)$

The exploitation of network-learning economies strictly depends on the properties of the technology in terms of *opportunity*, *cumulativeness* and *appropriability*. *Opportunity* is defined as the expected rate of profit (P^e) and, therefore, the higher the expected profit when adopting the new technology, the higher its speed of diffusion. *Cumulativeness* and *appropriability* represent the capacity of a new knowledge to generate new innovation and to prevent the possibility to be imitated, thanks to the *tacitness* of the knowledge or to the existence of rights on the intellectual property (patents) (IPR). Hence:

$\Delta\lambda = f(P^{e+}, IPR^-)$

Thus, we can imagine the following framework:

$$Y_{t-1} \rightarrow I_t \begin{cases} \rightarrow \kappa(Y^+, E^+) \\ \rightarrow \lambda\,(P^{e+}, PR^-) \end{cases} \rightarrow \Delta^+ \pi_t \rightarrow Y_t$$

in which it is possible to recognize a virtuous circle between investment activity, increase of knowledge, increase of productivity and increase of income.

Some points need to be underlined:

1. cognitive accumulation is based on two different factors, the first one has to do with the supply side analysis, the second one with demand variables;
2. supply variables are linked to investment activity and to the property of technology which are embodied in the knowledge creating processes;
3. demand variables affect generation and diffusion of knowledge and, therefore, productivity level, *via* positive externalities and income increase;
4. the accumulation of supply variables and demand factors leads to the existence of possible increasing returns of scale.

In other words, the proposed framework is a new proposition of the Kaldor-Verdoorn law, according to which the original static scale economies (able to increase demand) are substituted with dynamic scale economies, implemented by R&D activity and knowledge diffusion.

Let us now describe the demand side of the CC framework. Looking at the experience of Usa in the ’90s, aggregate demand is more and more influenced by the dynamics of the financial-products retail market and by the profits deriving from the internationalization of production. These two variables have a greater impact on the investment activity rather than on consumption, as a consequence of the decline of the wages-productivity nexus. Hence:

Financial-products retail market
$\rightarrow \Delta I \rightarrow D$
Profits

For most of the cognitive workers, the wage regulation is also based on the distribution of capital gains. Therefore, the financial-products retail market also affects consumption activity C(w) and, likewise, demand level.

Financial-products retail market $\rightarrow$ C(w) $\rightarrow$ D

Therefore, in the cognitive capitalism, the relationship between the supply and demand sides is not direct and immediate as it is in the Fordist capitalism. The absence of the wage-productivity nexus is solved by an indirect *liaison* among productivity, financial-products retail market and income polarization. Since this relationship cannot be considered stable, the dynamic equilibrium of the system is not guaranteed.

Equilibrium conditions depends on the incidence of network economies and intellectual property rights (externalities), on productivity, on the effects on productivity of both dynamic economies (network and learning economies) and static economies, on the public expenditure and on the income multiplier by consumption, which is lowered by taxes and investment propensity. The rate of growth of productivity is always increasing if network economies are more relevant than intellectual property rights in affecting productivity growth. The rate of growth of output is declining, because the increase of productivity penalizes employment and, therefore, consumption with negative effects on demand growth. Since real wages are not indexed to productivity gains (as in the Fordist paradigm), there is no wage compensation to the reduction or precariousness of labour force. It is interesting to notice that the intercept of the output growth can be positive for high values of public expenditure only, which, in any case, must be superior to the effects of externalities on productivity. With this last exception, the system is structurally unstable. It is possible that the dynamics of output and demand on one side and the dynamics of productivity on the other, are not following the same trend, raising increasingly higher degrees of instability[17].

3.3 A scheme of cognitive capitalism with basic income

Let us now introduce a BI policy. The possible scenarios that we will obtain depend on the correlations between dynamics of productivity, BI and output. The dynamics of output depends on the impact of investments on productivity growth[18]. In CC the investment activity reaches its maximum efficiency if it is able to capture the *general intellect* which is present in the territory. Hence, it is based on the existence of strong positive externalities and on both the level of aggregate income and a fair income distribution. The latter are the necessary constraints for the development of sort of a social cooperation which minimizes the risk of dismissals with negative effect on production. At the opposite side, the propensity of the single entrepreneur to invest is based on high level of profit expectations and on the existence of property rights or high degrees of cumulativeness which allow extra-profits, to the detriment of other entrepreneurs. Hence, there is a trade off between aggregate demand conditions and individual entrepreneur's decisions. It is a kind of trade-off that is similar to the Fordist one, as far as the level of monetary wages is considered: on one side, a distortion of the income distribution towards the wage-owners implies a lower level of consumptions, with a negative effect on the aggregate profit, on the other side, low wages are profitable for the single entrepreneurs.

In CC, the novelty is that an unfair income distribution, or a lower income level, risks to lead to a reduced ability of generating knowledge, and that an excessive technological appropriability can result in a lower diffusion of knowledge and learning. The introduction of a BI could represent the first step towards a new social compromise. From this point of view, the introduction of a BI implies more positive externalities and a fairer income distribution which affects the ability of generating knowledge and innovation, with indirect positive consequences on productivity trends and aggregate profit levels. In other words, BI facilitates the exploitation of dynamic learning economies of scale, through the introduction of a virtuous circle between increasing productivity and raises in investments. Because of learning processes and externalities effect, productivity rises and, since information and communication technologies are characterized

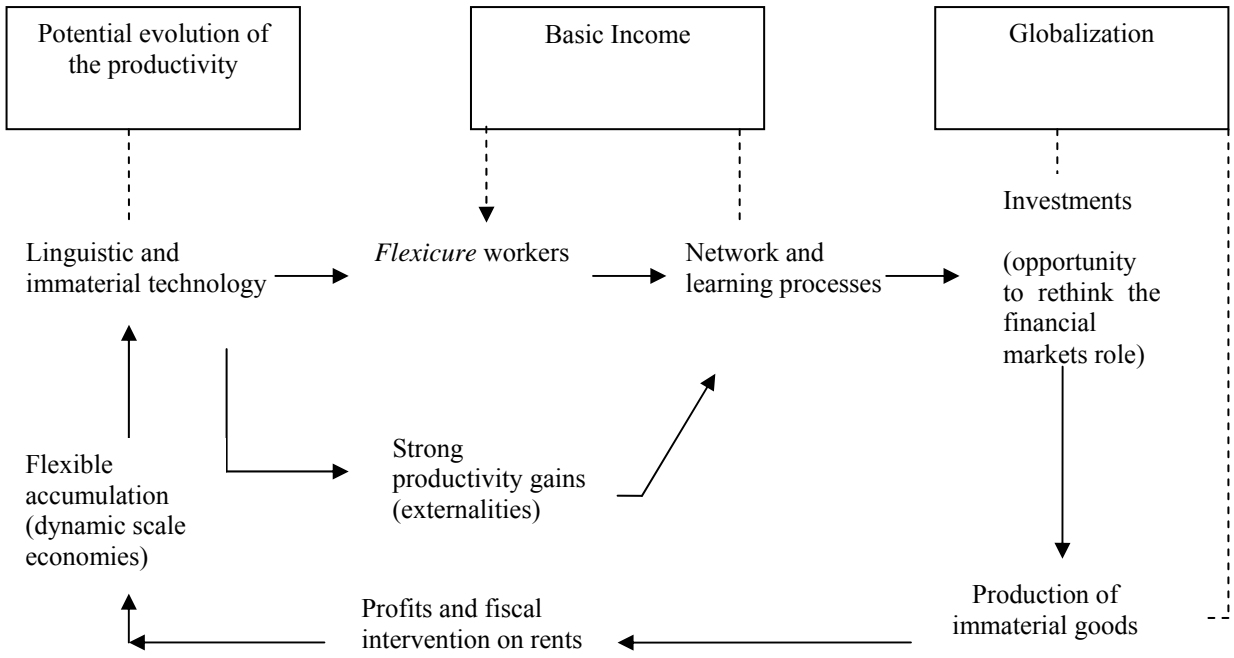
[17] See Appendix.
[18] See Appendix.

by high degrees of *cumulativeness*[19], there is a positive correlation between productivity and investments. Hence:

BI → κ, λ → π → I → Y

In this respect, the problem of understanding what constitutes a living standard becomes a problem of innovation policy. The decent level of living standard depends on a new capital-labour compromise. A BI policy could represent only the starting point for this new social compromise. In CC income security, housing, absence of discrimination on workplaces, mobility, knowledge and skills, free information and free communication represent both needs and productivity conditions. From a juridical point of view we see the necessity to define new rights, i.e. *right to basic income stability*, *right to housing*, *right to work security*, *right to mobility*, *right to culture, knowledge and skills* (AAVV 1997)[20].

Figure 3: The possible virtuous circle of cognitive capitalism with basic income



[19] See Winter 1984, Dosi 1987, Fumagalli 1995.

[20] The definition of these new generation rights can be summarised with the term *flexicurity. Flexicurity* means the possibility to be flexible in an active way without being precarious. In other words it is *the right to a free choice among work opportunities* instead of *the right to work* (whatever it is) In the academic field, flexibility and security are unambiguous concepts. Flexibility is often equated to a low degree of job protection, while security is equated to income security. However, flexicurity is also connected to issues such as working time, work functions, pay, active labour market policy measures, education and training, leave schemes, etc. The research also shows that flexibility and security are not necessarily a contradictions in terms. Flexicurity can be seen as a 'win-win' situation, with both employers and employees, as well as society, benefiting if the right combination of flexibility and security is chosen.

The introduction of basic income leads to the question of how to finance it. Nationally, we can imagine a fiscal intervention related to the role played by rent in a cognitive economy. We propose a theoretical distinction between material and immaterial rent: material rent is the income paid because of the productivity of a specific factor, i.e. the best land in Ricardian theory. Immaterial rent is defined as the wealth produced by the innovative skills of the labour, incorporated in a different productive factor (land or capital) whose owner (landlords or capitalists) appropriates for institutional reasons or dominant positions. Immaterial rent is prevalent in the cognitive context. It depends on the innovative regime, property rights on innovations, the dynamic scale economies (learning and positive externalities). The rates of productivity growth are much higher than the official statistics say; they measure productivity gains only in material terms (number of pieces, worked hours...) and do not consider the immaterial productivity based on cognitive activities applied to production. This added value should be the taxable basis for financing BI.

In the international field we can remember two interventions:

- the Tobin tax on the speculative financial transactions;
- a fiscal intervention on foreign direct investments to reduce outsourcing and to limit social dumping strategies.

In presence of increasing degrees of financial and economic uncertainties, BI warrants higher stability on the demand side, able to favour a stable trend in private consumptions and to generate a planning of private investments in the medium-long run. We are in presence of a new trade-off. Financing BI implies an increase in taxes, which may penalize consumption level and aggregate demand with negative effects on production. From this point of view, the introduction of BI has the simultaneous effects of both increasing productivity through the bettering of generation and diffusion of knowledge (κ and λ) and, conversely, reducing expected profit for entrepreneurs because of the increasing taxes on rent and profit itself. In this latter case, the propensity to invest (σ) can be lower.

$$\text{BI} \rightarrow \begin{cases} \Delta^{+}T \rightarrow \Delta^{-}I \rightarrow \Delta^{-}Y & \text{(a)} \\ \Delta^{+}\kappa, \Delta^{+}\lambda \rightarrow \Delta^{+}\pi \rightarrow \Delta^{+}I \rightarrow \Delta^{+}Y & \text{(b)} \end{cases}$$

Which of these two effects will be prevalent? The answer is decisive to implement a process of potential self-financing of BI.
Therefore: in case (a) the final reduction of income level (GNP) would reduce taxes and, therefore, the possibility to finance BI:

$$\Delta^{-}Y \rightarrow \Delta^{-}T \rightarrow \Delta^{-}BI$$

In case (b), the result is the opposite. BI, trough a positive effect on income level, is self-financing, thanks to a virtuous circle.

$$\Delta^{+}Y \rightarrow \Delta^{+}T \rightarrow \Delta^{+}BI$$

4. Concluding remarks

The transition from Fordist-industrial capitalism to CC is characterized by the passage from a stable structure of accumulation to an unstable one. This instability is mainly due to the lack of a

relationship, able to guarantee a dynamic equilibrium, between supply conditions, affecting productivity trend, and demand conditions, affecting a fair income distribution,. The introduction of a BI policy can be the first step towards a positive solution. BI is compatible with the new way of accumulation, based on the exploitation of dynamic scale economies. If BI is introduced, we see two positive effects on demand and output. BI increases productivity, through network (externalities) and learning processes and, at the same time, demand, *via* consumption level. This double result is not always guaranteed. On one side, it depends on how much BI positively affects productivity, and the greater its probability, the lower the role played by intellectual property rights and the higher the diffusion of network economies (*general intellect* and social cooperation); on the other side, it depends on the way BI is financed. This latter point requires a taxation system, which does not tend to penalize investment activity in immaterial production (net economy) but rather rents and excessive extra-profits. These results are depending on the assumptions of closed economy, in which financial markets play no role at all. Output internationalization, on one side, and financial globalization, on the other, in the short run, can succeed in minimizing or postpone these contradictions.

Some points need to be examined in detail to better understand the effects of a BI policy. In CC, the increase of productivity is no more internalized in wage dynamics, but in financial markets (Boyer 2004 b). Therefore, it is necessary to analyze the relationship between increase in productivity and increase in demand, through the plus-values generated in the stock-exchange market. This is sort of an income multiplier which provides wealth only for people who can invest in financial markets. Secondly, linguistic and immaterial technologies are characterized by a high degree of cumulativeness and appropriability, especially as far as immaterial investments are considered. Therefore, it is necessary to better define the investment function; for instance, it should be useful to separate the immaterial investment activity from the material investment dynamics (machinery). The former, because of high levels of cumulativeness, learning and network economies, is the result of a virtuous circle between productivity and investment growth. In this case, BI, if able to improve network and learning processes, is positively correlated to the investment activity, thanks to the increase in productivity. The second type of investment, more traditional and of a Fordist kind, is, on the contrary, penalized by BI because of the pressure on tax level. With this change, the increase in productivity can affect the level of demand through investments and the function of the output growth rate can become positive. The role played by the financial product retail market in affecting demand, in order to provide a dynamic equilibrium between output and demand, can not be considered as structural.

ACKNOWLEDGEMENTS

A preliminary version of this paper was presented at the Annual Meeting of Allied Social Science Associations (ASSA) Boston, MA January 6-8-2006. We would like to thank all the participants and especially John Marangos for their helpful comments. Thanks also to Filippo Biscarini for his linguistic revision of the text.

REFERENCES

Aa.Vv.
La Democrazia del Reddito Universale, Roma, Manifestolibri, 1997

Aglietta M.
A Theory of Capitalist Regulation: the US Experience, London: NLB, 1979 (first published in French 1976).
Postface à la réédition de *Régulation et crise du capitalisme*, Edition Ocile Jacob, Paris, 1997.

Atkinson A.B.
Incomes and the Welfare State, Cambridge University Press, Cambridge, 1995 a
Public Economics in Action. The Basic Income/flat Tax Proposal, Clarendon Press, Oxford, 1995 b

Atkinson, A.B. Morgensen, G.V. (ed.)
Welfare and Work Incentives. A North European Perspective, Clarendon Press, Oxford, 1993

Boyer R.
"Technical change and the theory of regulation" in Dosi et al. 1988.
Théorie de la regulation. 1.Les fondamentaux, La Decouverte, Paris 2004 a.
The future of economic growth, Edwar Elgar, Northampton (MA), 2004 b.

Bowles S.
Is Income Security Possible in a Capitalistic Society? An Agency-Theoretic Analysis of an Unconditional Income Grant, in *European Journal of Political Economy*, vol. 8, pp. 557-578, 1992

Donzelli F.
Il concetto di equilibrio nella teoria neoclassica, La Nuova Italia Scientifica, Roma, 1986.

Dosi G.
"Sources , Procedures, and Microeconomics Effects of Innovation" in *Journal of Economic Literature*, vol. XXVI, n.3, 1988.

Dosi G., Freeman C., Nelson R., Silveberg G., Soete L. (ed.)
Technical change and economic theory, Pinter, London, 1988.

Fumagalli A. e Lazzarato M. (ed.)
Tute Bianche. Disoccupazione di Massa e Reddito di Cittadinanza, DeriveApprodi, Roma, 1999.

Fumagalli A.
Moneta e tecnologia: le istituzioni instabili dell'economia capitalistica, Franco Angeli, Milano 1995.
Ten Proposition on Basic Income, Basic Income in a Flexible Accumulation System, BIEN Congress, 2000 - http://www.etes.ucl.ac.be/BIEN/Archive/Congress/Berlin2000.htm
Bioeconomics, labor flexibility and cognitive work: the unequal exchange, USBIG Congress, 2002, http://www.usbig.net/papers/047-Fumagalli-bioeconomics.doc
Lo spazio come esternalità in via di estinzione: terziarizzazione e lavoro cognitivo, S.I.E. - XLVI riunione annuale, Napoli 2005, http://www.sie.unian.it/incontri/rsa46/papers/L1-02.pdf.

Gorz A.
Misères du présent, richesse du possible, Galilée, Paris, 1997.

Groot L.
Basic Income and Unemployment, Thela Thesis, 1999
Unemployment and Basic Income, Kloower, 2001

Groot L., Peeters H.
A Model of Conditional and Unconditional Social Security in an Efficiency Wage Economy: The Economic Sustainability of a Basic Income, in *Journal of Post-Keynesian Economics*, n. 19, pp. 573-597, 1997

Kaldor N.
Causes of the Slow Rate of Economic Growth of the United Kingdom: an Inaugural Lecture, Cambridge, Cambridge University Press, 1966.
"Growth and Verdoorn Law: a comment on Mr Rowthorn's article", *Economic Journal*, vol. 85, 1975.

Kesenne S.
The Unemployment Impact of a Basic Income, Report 93/286, 1993

Kuhn A.
The structure of scientific revolution, 2°Ed, University of Chicago Press, Chicago, 1962.

Layard, L. Nickel, S. Jackman, R.
Unemployment: Macroeconomic Performance and the Labor Market, Oxford University Press, Oxford, 1991

Lipietz A.
Behind the Crisis, the Exaustion of a Regime of Accumulation. A «Regulation School» Perspective on some French Empirical Works, in «Review of Radical Political Economy», vol. XVIII, n.1-2, 1986.

Maddison A.
The World Economy: A Millennial Perspective, Development Centre Studies, Paperback, 2002.

Malerba F. *et al.*
History-Friendly Models of Industry Evolution: The Computer Industry, *Industrial and Corporate Change*, 8(1): 3-40, 1999.

Marx K.
Grundrisse, Vintage, New York, 1973; or. ed. *Grundrisse der Kritik der Politischen Ökonomie*, Dietz, Berlin 1953.

McCombie J., Pugno M., Soro B. (ed.)
Productivity Growth and Economic Performance. Essays on Verdoorn's Law, Palgrave Macmillan, 2002.

Moulier Boutang Y.
Capitalism cognitf et nouvelles formes de codification du rapport salarial, in Vercellone C. (sous la direction de), *Sommes-nous sortis du capitalisme industriel?*, La Dispute, Paris 2003.

Negri A.
Marx oltre Marx. Quaderno di lavoro sui Grundrisse, Feltrinelli, Milano 1979 - Eng. Trans. *Marx Beyond Marx: Lessons on the Grundrisse*, New York: Autonomedia, 1991.

Nelson R.R. e Romer P.M.
Sciences, economic growth and public policy, in Dale Neef, G. Anthony Siesfeld e Jacqueline Cefola (a cura di), *The economic impact of knowledge*, Butterworth/Heinemann, Boston, 1998, p. 43-59.

Panzieri R.

Plusvalore e pianificazione, "Quaderni Rossi", 1964, 4 - Eng. Trans. *Surplus value and planning. The Labour Process & Class Strategies*, London 1976

Pasinetti L.L.
Critique of the Neoclassical Theory of Growth and Distribution, «bnl Quarterly Review», I iii, 215, 2000.

Serati M.
Reddito di Cittadinanza: Un'opportunità o una Trappola Insidiosa per l'Occupazione? Una Verifica Empirica per il Caso Italiano, in Lunghini, G. Silva, F. Targetti-Lenti, R. (edited by), Op. Cit., 2001

Tronti M.
Operai e capitale, Einaudi, Torino 1971[2] - partially translated in English on http://www.geocities.com/cordobakaf/index.html

Van der Linden B.
Basic Income and Unemployment in a Unionised Economy, Ires, working paper n. 9714, Université de Louvain, 1987

Van Parijs P.
Arguing for Basic Income, Verso, London, 1992
Real Freedom For All . What (If Anything) Can Justify Capitalism, Oxford University Press, Oxford, 1996
Basic Income for All, Boston Review, 2000 - www.artsci.wustl.edu/~anderson/ introethics/ vanparijs.htm
Basic Income: A Simple and Powerful Idea for the 21st Century, paper presented at the 'Real Utopias' conference, 2002 - www.etes.ucl.ac.be/BIEN/Files/Papers/ 2000VanParijs.pdf

Verdoorn P.J.
Fattori che regolano lo sviluppo della produttività del lavoro, in «L'Industria», vol. 1, 3-10, 1949; reprinted in English as chapter 2 of Mc Combie J., Pugno M. and Soro B. (edited by) 2002.

Winter S.
"Schumpeterian Competition in Alternative Technological Regimes" in *Journal of Economic Behaviour and Organization*, vol. 5, pp. 287-320, 1984.

Zanini A. e Fadini U.
Lessico postfordista, Feltrinelli, Milano, 2001; *Introduction*, translated in English by Arianna Bove, http://www.generation-online.org/t/postfordismo.htm

Appendix

Formalization of cognitive capitalism and its structural instability

[1a] $\dot{\pi} = a\dot{k} + b\dot{\lambda} + c\Delta I + d\dot{Y}$

[2a] $\dot{k} = e\dot{Y} + E$

[3a] $\dot{\lambda} = h\Delta I - IPR$

[4a] $\Delta I = \sigma\dot{Y}$

[5a] $\dot{D} = \alpha\ \dot{C}_n + \beta\Delta I + \gamma$

[6a] $\dot{C}_n = w\dot{N} - t\dot{Y}$

[7a] $\dot{N} = \dot{Y} - \dot{\pi}$

[8a] $Y = D \quad \dot{Y} = \dot{D}$

$\dot{\pi}$ = rate of growth of productivity
$\dot{k}$ = dynamic network economies
$\dot{\lambda}$ = dynamic learning economies
ΔI = investment activity
$\dot{Y}$ = growth rate of output
E = externalities (given and constant in the short period)
$\dot{D}$ = demand dynamics
$\dot{C}_n$ = consumption dynamics
γ = parameter which denotes a constant dynamics of public expenditure
$\dot{N}$ = growth rate of employment
$w\dot{N}$ = wages mass
IPR = intellectual property rights
$t\dot{Y}$ = taxation

By reducing these two systems, by simplifying and substituting where necessary, in equilibrium we get the following two linear differential equation model:

[9a] $\dot{\pi} = A_A + B_A\dot{Y}$ where $A_A = aE - bIPR$ and $B_A = [(bh + c)\ \sigma + ae + d]$
[10a] $\dot{Y} = C_A - D_A\dot{\pi}$ where $C_A = \gamma$ and $D_A = [\alpha w / (1 - \alpha w + t + \beta\sigma)]$

In equilibrium, in which $\dot{\pi} = \dot{Y}$, the employment level reaches its maximum value and remains stable.
We can rewrite the two equations in the following way:
Equilibrium conditions are:

$$\dot{\pi}_E = \frac{A_A + B_A C_A}{1 + B_A D_A} \qquad \dot{Y}_E = \frac{C_A - A_A D_A}{1 + B_A D_A}$$

A = incidence of network economies and intellectual property rights (externalities) on productivity
B = effects on productivity both of dynamic economies (network and learning economies) and of static economies
C = public expenditure;
D = proxy of the income multiplier by consumption, which is lowered by taxes and investment propensity.

We face three cases:

Case 1a:	$A_A < 0$	→	$\dot{Y}_E > 0, \quad \dot{\pi}_E > 0$
Case 2a:	$A_A > 0$ and $A_A < C_A$	→	$\dot{Y}_E > 0, \quad \dot{\pi}_E > 0$
Case 3a:	$A_A > 0$ and $A_A > C_A$	→	$\dot{Y}_E < 0, \quad \dot{\pi}_E > 0$

The rate of growth of productivity is always increasing if network economies are more relevant than intellectual property rights in affecting productivity growth.
The growth rate of output is declining, because the increase of productivity penalizes employment and, therefore, consumption with negative effects on demand growth. Since real wages are not indexed to productivity gains (as in Fordist paradigm), there is no wage compensation to reduction or precariousness of labour force. It is interesting to note that the intercept of the output growth can be positive only for high values of public expenditure, which, in any case, must be superior to externalities effects on productivity ($\gamma > [aE - bPR]$).
With this last exception, the system is structurally unstable.

Formalisation of cognitive capitalism with basic income

[1b] $\dot{\pi} = a\dot{k} + b\dot{\lambda} + c\Delta I + d\dot{Y}$

[2b] $\dot{k} = e\dot{Y} + E + kBI$

[3b] $\dot{\lambda} = h\Delta I - IPR + qBI$

[4b] $\Delta I = \sigma\dot{Y} + \zeta\,\dot{\pi} - g\dot{T}$

[5b] $\dot{D} = \alpha\,\dot{C}_n + \beta\Delta I$

[6b] $\dot{C}_n = w\dot{N} + \delta BI - \dot{T}$

[7b] $\dot{T} = t\dot{Y}$

[8b] $\dot{N} = \dot{Y} - \dot{\pi}$

[9b] $Y = D \qquad \dot{Y} = \dot{D}$

[10b] $\dot{T} = BI$

BI affects learning and network economies with positive effects on productivity rate of growth: see equation [2b] and [3b]. On one hand, BI is financed by an increase of taxes, which reduces investment activity, as shown in equation [4b] and, on the other hand, improves consumption (see equation [6b]). Finally, we suppose public budget equilibrium (see equation [10b]).
By reducing the model, by simplifying and substituting where necessary (see the appendix), in equilibrium we get the following two linear differential equation model:

[11b] $\dot{\pi} = A_B + B_B \dot{Y}$

[12b] $\dot{Y} = C_B + D_B \dot{\pi}$

where

$$A_B = \frac{aE - bIPR + (bq + ak - bhg - cg)BI}{1 - c - bh\zeta}$$

$$B_B = \frac{ae + d + bh\sigma + c\sigma}{1 - c - bh\zeta}$$

$$C_B = \frac{\alpha\delta - \alpha - g}{1 - \alpha w + \beta\sigma} BI$$

$$D_B = \frac{\zeta - \alpha w}{1 - \alpha w + \beta\sigma}$$

Equilibrium conditions are:

$$\dot{\pi}_E = \frac{A_B + B_B C_B}{1 + B_B D_B} \qquad \dot{Y}_E = \frac{C_B - A_B D_B}{1 + B_B D_B}$$

The dynamics of productivity ($\dot{\pi}$) is positively correlated to BI and to output. The dynamics of output ($\dot{Y}$) depends on the value of the coefficient ζ that rules the impact of the investment on the productivity growth:

- If $\zeta < \alpha w$, then $\dot{Y}$ is decreasing and negatively correlated to the growth rate of productivity and positively to BI, i.e. $\dot{Y} = f(\dot{\pi}^-, BI^+)$. We assume that A >0, that is aE+(bq+ak-bhg-cg)BI > bIPR. This hypothesis is justified by the fact that the presence of BI implies a positive effect on productivity growth able to compensate any negative effect of intellectual property rights. Hence, we face only two cases:

  Case 1b: A > 0 and A > C → $\dot{Y}_E > 0, \quad \dot{\pi}_E > 0$
  Case 2b: A > 0 and A < C → $\dot{Y}_E < 0, \quad \dot{\pi}_E > 0$

  In order to discuss these two case, if network economies are more relevant than intellectual property rights, the probability that A > C increases: in fact, it is sufficient that ak+bq > αδ.

- If $\zeta > \alpha w$ then the $\dot{Y}$ line is increasing.

  If: $\frac{\zeta - \alpha w}{1 - \alpha w + \beta\sigma} > \frac{ae + d + bh\sigma + c\sigma}{1 - c - bh\zeta}$, then the $\dot{Y}$ line is less elastic than the $\dot{\pi}$ line

  In this case we obtain a result not so far from the Fordist compromise, as Boyer represented it (see Boyer 2004 a).