

The Neoliberal Trajectory, the Great Recession and Sustainable Development

Alessandro Vercelli
DEPS (University of Siena)
and SOAS (University of London)

Abstract

This paper argues that the current global crisis is the direct consequence of a development model that is unsustainable from the financial, economic, social and environmental points of view. Such a model became progressively dominant since the late 1970s when the neoliberal policy strategy started to become hegemonic. The new policy regime fostered the recent process of globalisation and financialisation leading to a perverse interaction between the main dimensions of sustainability originating and reinforcing the Great Recession. The crisis, in its turn, worsened many crucial sustainability indicators generating a vicious circle that might last for a long time. The need for a new sustainability-based economic paradigm is confirmed by the observed gap between the GDP growth indicators and the wellbeing of individuals and by the nature and requirements of the existing technological trajectory. The paper concludes that we urgently need a radical revision of the current development model towards a more sustainable direction to find a durable escape from the present crisis and start up a more satisfactory development trajectory.

Keywords: sustainable development, the great recession, the neoliberal paradigm, technological trajectories

JEL classification: G01, I31, O13, Q01, Q56

1 Introduction¹

This paper argues that the current global crisis is the direct consequence of a development model that is unsustainable from the economic, financial, social and environmental viewpoint. Such a model became progressively dominant since the late 1970s when the neoliberal policy strategy started to become hegemonic at the world level (Borghesi and Vercelli, 2003 and 2008; Vercelli, 2011 and 2012).

The increasing flexibility of the labor market and the progressive dismantlement of the Welfare State largely increased income and wealth inequality, causing a growing polarization among social classes that has undermined social cohesion (see, e.g., Milanovic, 2005; Piketty and Saez, 2006; Rothstein and Uslaner, 2005) while reducing the purchasing power of middle and lower classes and increasing the poverty plague also in several industrialized countries (*social unsustainability*). This brought about a downward trend of aggregate demand that contributed to slow down the growth rate in the industrialized countries (*economic unsustainability*). This tendency has been partially counterbalanced by the increasing debt of economic units, including the private debt of households and the sovereign debt of states, and the rapid financialisation of the economy that has progressively increased the contribution of finance to income formation. This ‘doping’ of aggregate demand, however, was not sufficient to keep the GDP growth rate of industrialized countries at the same level experienced during the Bretton Woods period (1945-1971), that was characterized by a predominant Keynesian policy strategy (Cameron and Wallace, 2002). In addition, the rapid increase of private and public debt and the hypertrophy of finance have undermined the financial stability of the system. Severe financial crises, absent during the Bretton Woods period, reappeared during the 1970s and progressively increased their frequency, intensity and geographical extension (*financial unsustainability*) (see Kaminsky and Reinhart, 1999; Stiglitz, 2010, 2012; Krugman, 2012).

The monetary policy to sustain the value of financial assets pursued by the Federal Reserve under Greenspan (1987-2006) and then adopted by most other central bankers, managed to moderate the adverse effects of financial instability though only in the short term transferring into the future the risks of growing financial fragility up to the outburst of the recent global crisis. The deep and persistent financial turmoil originated by the subprime crisis and the consequent recession of the real economy are thus the result of a perverse interaction between the four main dimensions of unsustainability. The financial crisis, in its turn, has remarkably worsened many social and economic sustainability indicators generating a vicious circle that might last for a long time. The present crisis, in particular, has been greatly reinforced by the *environmental unsustainability* of the existing development model. While the speculative bubble of the Real Estate sector started to deflate in the USA, the oil price rapidly increased from less than \$50 per barrel in 2005 to a new record of more than \$150 in spring 2008. This provoked a rise in the production costs of all goods (particularly of food). The Central Banks reacted to the consequent cost inflation with a significant increase in the discount rate that raised the loans' interest rate. This undermined the borrowers' capacity to comply with mortgage payments, compelling many of them to sell their house or to default, with a consequent collapse of the housing market and the price of mortgage-based derivatives that has triggered a contagion process in the global system, especially in the Euro zone. This analysis calls for a radical revision of the current development model towards a more sustainable direction that is urgently needed if we are to get out of the present crisis and start up a new development phase.

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The structure of the paper is as follows. I analyze in section 2 why and how the neoliberal model of development has contributed to the economic, financial and social unsustainability of the ongoing development trajectory. Section 3 discusses the relationship between the neoliberal model of development and environmental sustainability. Section 4 draws the main policy implications of the preceding analysis. Section 5 concludes.

2.1 The neoliberal development trajectory: the genesis

After the first industrial revolution capitalism evolved through a sequence of development trajectories each of which has been based on a recognizable ‘model of development’ meant to sustain the growth rate of the economy. After WWII we may identify two such waves. First emerged the Bretton Woods trajectory based on a Keynesian policy strategy and the establishment of a dependable welfare state. This trajectory started at the end of WWII and lasted until 1971 when Nixon unilaterally declared the inconvertibility of the dollar. After a period of transition lasting until the late 1970, a new development trajectory emerged, the Neoliberal one, which is still ruling the economy notwithstanding the devastating crisis that started in 2007. Nixon’s move was a massive act of deregulation of the international monetary system that complied with the monetarist precept of flexible exchange rates based on an adamant faith in the self-regulating virtues of markets. The pressure on policy authorities to deregulate systematically all the markets became stronger and started to materialize in different fields. In the 1970s the resistance of economists and policy makers committed to Keynesian principles was still strong but was progressively eroded by the stagflation of the 1970s.

A new model of development typically emerges as solution of an epochal crisis attributed to the preceding model of development and lasts until its weaknesses emerge and accumulate growing disequilibria eventually leading to a new epochal crisis interpreted as a proof of its unsustainability. This is the case also with the two most recent development trajectories. The Bretton Woods trajectory was a response to the Great Depression interpreted as the failure of the preceding laissez-faire capitalism. The new Keynesian policy strategy based on stricter regulation of markets, financial repression, full employment policies and the build-up of a dependable welfare state sustained a successful wave of unprecedented growth from the end of WWII until the early 1970s. Since the late 1960s this policy strategy was increasingly challenged by liberal economists, in particular the ‘monetarists’ led by Milton Friedman. They attacked in particular the alleged inflationary bias introduced in the real economy by the Keynesian policies of full employment and the alleged inefficiency produced by the systematic intervention of the state in the economy. The stagflation of the 1970s seemed to confirm the monetarist diagnosis and paved the way towards a radical revolution in macroeconomics and, consequently, in the economic policy strategy.

The decisive battle between monetarists and Keynesian economists was fought on the terrain of the Phillips curve. The monetarists claimed that the Keynesian use of the Phillips curve as a stable menu of policy choices to ensure full employment had fed increasingly inflationary expectations enhancing its slope and shifting it upwards. Friedman (1968) argued that, owing to the classical dichotomy between the monetary and the real part of the system, the Phillips curve had to be conceived as a vertical line crossing the abscissa at the ‘natural rate of unemployment’ corresponding to its value in a general equilibrium model. Any attempt at reducing unemployment beyond its natural rate (as pursued by Keynesian policy) would thus trigger an unsustainable process of deteriorating expectations and accelerating inflation. Friedman (op.cit) concluded that macroeconomic policy should forsake countercyclical policies of Keynesian inspiration meant to guarantee full employment by adopting instead fixed monetary and budgetary policy rules consistent with market self-regulation. In this view an improvement of equilibrium may be obtained only through structural policies capable to shift decision power from the state to the market, i.e. privatization and deregulation and the dismantling of the welfare state.

The first government to adopt this new-classical policy strategy was that of Mrs. Thatcher appointed Prime Minister in 1979 in the UK. Her ground-breaking leadership was soon followed in the US by the Reagan administration since 1980 and then in rapid sequence by most other countries. We can thus take 1979 as a conventional starting point of the neoliberal development cycle.² We may distinguish 4 phases: The Monetarist Disinflation: 1979-1987, The Roaring 1990s: 1987-2000, The Zero Years: 2000-2007, The Great Recession: 2007-2014.

2.2 The ‘Monetarist Disinflation’

The first and foremost problem to be solved was that of stagflation that had haunted the 1970s. The new chairman of FED Paul Volker (1979-1987) under the influence of monetarism of Friedman (1968) and Lucas (1981) immediately adopted a very restrictive monetary policy meant to curb inflation and inflationary expectations. Inflation, which had peaked in the US at 13.5% in 1981, was lowered to 3.2% by 1983. This result was obtained by inducing a severe recession of the real economy that lasted until the 1983 in the US and a few years longer in other industrialized countries. A robust and widespread recovery started only in the second half of the 1980s also in consequence of significant policy-induced structural changes in the economy that were going to characterize the neoliberal cycle from then on. The neoliberal governments exploited the situation of weakness of the trade unions induced by the sharp increase of unemployment to reform labor markets and the industrial relations by deregulating them in order to reach a level of flexibility consistent with the tenets of competitive markets. This policy modified the structural characteristics of the Phillips curve shifting it downwards and reducing its slope. This was considered a great success by the supporters of the neoliberal paradigm as it implied the elimination of the inflationary bias in the real economy attributed by them to the Keynesian policies. For a couple of decades even in periods of boom the rate of inflation in the real economy remained low overcoming the need of restrictive policy interventions such as those that had triggered the stop-and-go fluctuations of the Keynesian era. This in its turn contributed to reduce the variability of time series giving the illusion of a steadier growth regime (later called ‘Great Moderation’: see section 2.3).

These apparent successes, however, were obtained at the cost of serious ‘collateral effects’ that became increasingly evident with time. The first one refers to the inequality in the distribution of income that is a crucial condition of social sustainability. In most countries, in particular in the OECD countries, the trend of inequality that had slightly diminished in consequence of the welfare state policies pursued in the Bretton Woods period started increasing again in the late 1970s (see e.g. Borghesi and Vercelli, 2008). This new tendency was fed by the neoliberal policy strategy leading to a reduction, sometimes even inversion, of the progressivity of the fiscal system, the dismantlement of the welfare state and the enhanced flexibility of labor markets and industrial relations leading to a decoupling between labor productivity and real wages increase.

The second main social collateral effect was the increase in poverty in many developed countries. The hot debate on the relationship between globalisation and poverty is made particularly difficult by problems of measure. In what follows I will adopt the definition suggested by the World Bank classifying as poor any person whose income does not exceed the mean value of two dollars per day. Though this measure of poverty is quite rough, it is useful to give a first idea of its long-run evolution. Many mainstream economists have contended that the reduction in inequality is a questionable target as more inequality could give incentives to more personal effort and thus to enhanced productivity and higher growth. On the contrary, an extensive literature has recently shown that the negative impact of inequality on well-being is quite substantial (see e.g. Stiglitz, 2012). As for poverty no one denies that its reduction must be an important target of policy but the prevailing view maintains that a higher rate of growth is what is really needed to conquer poverty

² Another reason for choosing this conventional starting year is the adoption by the newly appointed chairman of Fed, Paul Walker of a strict monetarist policy soon imitated by the other Central banks. See section 2.3.

(see, e.g., Bhagwati, 2004). In this view the process of modernization accelerated growth to an unprecedented level and sustained its trend throughout two centuries. This explains why the percentage of the poor over the world population (poor ratio) steadily declined from more than 95% in the second decade of the 19th century to about 50% in the last decade. Projecting this decline in the future the optimists believe that the process of modernization supported by globalization is half-way to solve the problem of poverty. The trouble is that in the last two centuries the number of the poor continued to grow from about 1 billion in the second decade of the 19th century to about three billions (see e.g. Bourguignon and Morisson, 2002). The poor ratio on the world population declined mainly because the latter increased on average at a double rate. In addition projections of this kind are not reliable as the relevant trends depend on many factors that cannot be easily predicted. The subprime crisis started in 2007, for example, and the ensuing Great recession have greatly increased the number of the poor beyond the trend. Taking account of the decelerating demographic growth we cannot exclude that also the poor ratio may start soon to increase.

Contrary to the ‘Pareto law’ and the ‘Bhagwati hypothesis’, the growing trend of inequality since the beginning of the industrialization era played a crucial role in the increase of poverty: “had the world distribution of income remained unchanged since 1820, the number of poor people would be less than 1/4th than it is today and the number of extremely poor people would be less than 1/8th of what is today” (Bourguignon and Morisson, 2002, p.733). A further increase of the poor and malnutrition occurred in consequence of the Great Recession. The poverty rate has increased also in developed countries recently reaching the 13% of population in Italy, the 15.5 in Germany, the 15 % in the US. In addition, extensive empirical research documented a progressive deterioration of the ‘social capital’ on which the wellbeing of people crucially depends (Bartolini, 2011).

The increasing inequality and poverty affected the trend of private expenditure explaining the slowdown of GDP growth in the period 1980-2014 as compared to that of the period 1950-1979 (Maddison, 2004). This slowdown was mainly observed in the OECD countries rather than in developing countries less intoxicated by the neoliberal policy strategy. This tendency was counteracted through different measures. In particular households increased their indebtedness in the attempt to keep their life standards. This behavior was encouraged by governments even at the cost of increasing public debt even when this was in sheer contrast to neoliberal principles.

Since the late 1970s another trend changes its sign in contrast with much recent rhetoric arguments. The ratio between public debt and GDP that in the G-7 countries had progressively diminished from the high postwar levels (more than 100%) to much more manageable levels (about 40% in the middle 1970s) started increasing again in the late 1970s to breach before the 2007 financial crisis the 80% threshold (comparable to that of the mid 1950s) and then rapidly growing beyond 100% in consequence of the crisis (see figure 1). In sharp contrast to the widespread prejudice supported by governments, International Organizations and mainstream mass media that the sovereign debt crisis originated in Keynesian policies establishing over-generous social security transfers, the trend diminished in the Bretton Woods period characterized by the construction of the welfare state and full-employment Keynesian policies and turned upwards again when these policies were abandoned and substituted by neoliberal policies.

Figure 1 about here

An important factor of the above inversion is related to the growing Central Banks’ independence of treasury goals and directives and their consequent reluctance to play the role of ‘buyers of last resort’ of treasury bonds as played in the Bretton Woods period. In some countries this new orientation advocated by the banking system as an occasion to increase profits was sanctioned by specific legislative measures. A case in point is that of Italy that sanctioned in 1981 the so-called ‘divorce’ between Treasury and Bank of Italy. Similar measures were taken in other countries in the

1980s and 1990s. In the same mood the Charter of ECB does not admit its direct buying of sovereign debt, although this prohibition has been partially relaxed as a consequence of the sovereign debt crisis. The new orientation of central banks in the neoliberal era contributed significantly to the increase of public debt reducing seigniorage revenues and increasing the rate of interest to refinance debt. In the meantime the slowdown of the rate of GDP growth tended to increase the ratio between debt and GDP. Finally, many governments drawing inspiration from neoliberal principles did not hesitate to reduce significantly the taxes paid by rich people at the cost of increasing the burden of debt; typically the reduction of public social and security expenditure supposed to compensate the reduction of revenues did not prove to be sufficient ex post motivating further cuts in the welfare state expenditures. For example, during Regan's presidency the annual deficits averaged 4.2% of GDP after inheriting an annual deficit of 2.7% of GDP in 1980 under president Carter, so that the public debt rose from 26.1% GDP in 1980 to 41.0% GDP by 1988. The huge efforts after the subprime crisis to bail out the financial institutions believed to be "too big to fail", have significantly worsened both deficits and debt in most countries hit by the financial crisis. There is no evidence, however, in the "Years Zero" before the subprime crisis of a significant increase of deficit and debt ratio in the Eurozone (Lapavitsas, 2012). The high level of debt ratio cannot thus be considered as the triggering factor of the crisis. It has been rather a factor in the propagation of the crisis in the Eurozone but only in consequence of the unwise adoption of severe austerity policies.

2.3 The roaring 1990s

Since 1987 the structural changes in the real economy were accompanied by a new strategy in monetary policy as introduced and pursued by Greenspan, the new Chairman of FED (1987-2006). Greenspan took profit of the flattening of the Phillips curve by supporting a steady increase in the price of financial assets. This was believed to be a crucial prop to the rate of growth of GDP not only because it favored the growth of the financial sector and the connected sectors of insurance and real estate (FIRE), but also because the wealth effect of financiers and rentiers was believed to enhance the demand of real goods. This new policy alchemy seemed to work for a while leading in many countries to a few years of sustained growth often called 'roaring 1990s' (Krueger and Solow, 2002; Stiglitz, 2003). Unfortunately, the analogy with the 'roaring 1920s' was not limited to wording since it led to global financial crises, the second of which starting in 2007 proved to be as devastating as the Great Depression.

The new monetary policy has been often christened the 'Greenspan put' as it implied the setting of a floor to the price of financial assets without a ceiling. I prefer to call it 'asymmetric monetarism' as it aimed to avoid inflation in the real sector but not in the financial sector in the conviction that assets inflation was not transmitted to the real sector in consequence of a flat Phillips curve. The new policy was hailed as a stroke of genius by most contemporaneous experts and commentators but it implied very dangerous collateral effects that became increasingly evident with time. As a matter of fact, the inflationary bias observed in the real economy during the Bretton Woods period and blamed upon Keynesian policies was substituted by an inflationary bias in finance having different but not inferior pathological effects. First of all, Greenspan's asymmetric monetarism produced growing distortions altering the relative price, risk and expectations of financial, as compared to real, investment. The reduction of risk perception induced by the insurance of financial assets value implicit in this policy led the economic units to increase their indebtedness and financial fragility. This induced a tendency towards stagnation in the real economy that was only partially compensated by the wealth effect originated in the financial sector and this mainly in the economies having the leadership in the process of financialisation (the UK and the USA). This encouraged governments to 'dope' growth by favoring the indebtedness of households to sustain

aggregate demand, by relying also on unorthodox deficit spending policies (as in the case of the Reagan, Bush1 and 2 Administrations).

The second pathological consequence of asymmetric monetarism has been the increase of the number and size of investment bubbles fed by excess liquidity and the implicit insurance of financial assets value (e.g. the 'new economy' bubble). Of the 18 main financial crises identified by Kaminsky and Reinhart (1999) after WWII, 3 occurred in the second half of the 1970s, 7 in the 1980s, 8 in the 1990s. They were still local crises circumscribed to a particular institution (LTCM, 1998), sector (US saving and loan associations, 1984), or country (such as Italy 1990, Japan 1992). All these episodes happened after specific acts of deregulation confirming the decisive role played by the neoliberal policy strategies (ibidem). The prompt and generous bail-out of big banks under financial stress paved the way for the global crises of the 2000s years. The 1997 Asian crisis may be considered as the first global financial crisis (as it hit also the USA and Japan) but its center was not in the system's core. Only at the beginning of the new millennium the increasing financial instability led to devastating global crises centered in the core of the system.

Contemporary observers, however, focused on what was believed to be a great success of neoliberal policies: the reduction in volatility of business cycles fluctuations as exhibited by crucial economic variables such as GDP growth and unemployment observed in the period 1987-2007. This new regime was called 'great moderation' by Stock and Watson (2002), and was brought to the attention of the wider public by Ben Bernanke (then member and subsequently chairman of the FED, 2007-2013) in a speech at the 2004 meeting of the Eastern Economic Association (Bernanke, 2004). The Great Moderation was the joint consequence of the flattening of the Phillips curve forced by the neoliberal reforms of the labor market and industrial relations and the new monetary policy introduced by Greenspan. Higher employment rates in periods of boom did not translate in higher wages and inflation, while the slowdown of financial inflation was immediately thwarted by generous injections of liquidity in the financial system. Minsky (1986) was one of the few economists who understood that this short-term stabilization strategy was cumulating increasing financial instability to become irrepressible in the longer period. As a matter of fact the widespread conviction that the economic and financial performance had become more predictable and better controllable by policy authorities induced many economic units to hold less capital and to be less concerned about liquidity positions reducing their risk awareness and increasing their indebtedness.

2.4 The 'Zero Years': the genesis of the crisis and its propagation

The process of increasing financial instability culminated in the 'Zero Years' of the new millennium when two major global crises originated from the core of the system.³ First came the *new economy* (or 'dot.com') crisis in 2001. This was a serious warning of a major disaster approaching but its structural causes were generally neglected because also in this case the monetary policy introduced by Greenspan succeeded in thwarting the crisis sooner than expected, strengthening the confidence in the omnipotence of the invisible hand (helped by the Greenspan's visible hand).

In consequence of the dot.com crisis, speculation shifted from the immaterial goods of the information and communication technology (ICT) to brick-and-mortar goods. The huge bubble of the real estate sector in many countries (the US, the UK, Spain and so on) was destined to produce a crucial triggering factor of the 2nd, much more devastating, global crisis. The crisis of subprime and adjustable rate mortgages (ARM) in the US played the role of detonator of the crisis. The slowdown of housing prices in the 2nd half of 2006 did not worry most operators who expected a salutary soft landing. This economic factor, however, interacted with a host of financial, environmental and policy factors that are strictly related with the ultimate sustainability of the

³ Krugman (2009, p.1) suggested to call the first decade of the millennium the 'Big Zero decade' not for descriptive reasons (two zero after the 2) but because in it "we achieved nothing and learned nothing...none of the optimistic things we were supposed to believe turned out to be true".

neoliberal model of development. The price of oil increased from \$63 in December 2006 to \$147 in July 2008 triggering a process of cost inflation fed by an analogous spike of food price (figure 2). Notwithstanding the emerging crisis, central banks reacted as usual. The Fed did not hesitate to increase the discount rate from 2% in May 2004 to 6.25% in August 2008. This increased significantly the mortgage rate pushing into insolvency most holders of subprime and ARM mortgages and precipitating the housing price downwards (figure 3).

Figures 2 and 3 about here

We observe in this period a perverse interaction between financial, economic and environmental problems (in particular those related to the energy system based on fossil fuels) that makes clear the unsustainability of the neoliberal growth regime. This brought to an end the era of 'great moderation' making clear that the neoliberal model of development ended up by being haunted by a dual inflationary bias: to the inflationary bias in the financial sector discussed above one more is added in the real sector not related to wages (as in the Bretton Woods Era) but to the tendential increase of the price of natural resources. Not by chance the price of food and resources started to increase again in the second semester of 2009 notwithstanding the persisting stagnation in many countries.

The structural causes underlying the propagation mechanism of the crisis have increased further its destructive potential. In the Bretton Woods period the propagation mechanism was strong mainly within the real side of the economy being rooted in the conflict about income distribution leading to a shifting Phillips curve, stop-and-go fluctuations, accelerating inflation, and eventually stagflation. Since the late 1970s a deep transformation of the propagation process is detectable as it proceeds mainly through the financial side of the economy in consequence of the structural transformations started in the early 1980s often summarized with the label of financialisation. The neoliberal policies systematically pursued since the late 1970s aimed to liberalize the sector of finance that had been strictly regulated and controlled in the Bretton Woods period in reaction to the Great Depression blamed on unfettered finance. The liberalization of cross-country capital flows in the 1980s was a crucial driver of the process of globalization. This process produced a growing global interconnection among decision makers in economics and finance strengthening the mechanisms of contagion. In this new environment the sudden awareness of an excessive financial exposition in a changed environment immediately triggered the fire sale of assets to reduce indebtedness but this abated the price of assets increasing further the indebtedness ratio and inducing new rounds of hurried sale of assets (including the strategic ones) in a climate of growing panic. This process of debt-deflation in the financial sector soon triggered a second mechanism of propagation in the real sector (Fisher, 1933; Minsky, 1982 and 1986). The falling demand of real goods and services consequent to the generalized flight to safety and the ensuing negative wealth effect sank the price of assets and the supply of goods increasing unemployment and reducing further the expenditure in the real sector. The process of globalization increased the connectedness of economic units also at the international level by enhancing the strength and rapidity of the propagation process.

The connectedness between financial units via their balance sheets and the market has progressively increased in the neoliberal era in consequence of the systematic process of securitization. As Minsky (2008, pg.2-3) pointed out, "there is a symbiotic relation between the globalization of the world's financial structure and the securitization of financial instruments". In fact "securitization leads to the creation of financial paper that is eminently suitable for a global financial structure...globalization requires the conformity of institutions across national lines and in particular the ability of creditors to capture assets that underlie the securities" (ibidem). In addition the process of securitization was propelled by the illusion that a bank could transfer the risk of credit to the market in the belief, endorsed by mainstream economists, that the market knows better

than single individuals. However this proved only partially true (Gorton, 2010), and only at the cost of increasing systemic risk. In addition this illusion encouraged moral hazard as no one felt the responsibility of thoroughly evaluating the value and risk associated to holding an asset or security, and this encouraged imprudent and predatory practices such as those observed in the process of mortgage origination. In the end a systemic crisis has been more rapidly propagated by financially fragile banks and economic units.

The process of securitization was instrumental in particular to the emergence and development of shadow banks, i.e. “financial intermediaries that conduct maturity, credit, and liquidity transformation without explicit access to central bank liquidity or public sector credit guarantees” (Pozsar, et al., 2010, p.2).⁴ The shadow banking system propagates systemic risk and financial fragility in an opaque way as they typically rely on off-balance sheets operations. The subprime mortgage crisis started as a bank run within shadow banking (Gorton, 2010).

The first wave of the financial earthquake propagated very rapidly from the US mortgage sector to all the US financial system through mortgage-based derivatives and CDOs. The wave almost immediately propagated also abroad in consequence of the globalization of financial systems. The impact proved to be particularly devastating in the Eurozone where the peculiar design of the euro showed all its weaknesses. The big budget deficits due mainly to the huge public help offered without any condition to a virtually broke banking system adding to the huge debt accumulated in the last decade was the excuse for the forced adoption of austerity policies that were particularly tough and devastating in the weaker countries of the Union, so-called PIIGS (i.e. Portugal, Ireland, Italy, Greece and Spain). The systematic pressure of speculation on sovereign debt in the weaker countries of the Eurozone paralyzed the protest of citizen hardly hit by the consequences of these policies. The fragility of financial companies believed to be ‘too big to fail’ was transferred to the public balance sheets. The financial institutions so rescued did not show any gratitude and actively contributed to a systematic campaign against the unsustainable generosity of the welfare state: “... finance was rescued, only to turn and bite its rescuer” (Lapavitsas, 2012, p.2).

3 Environmental sustainability

In the second section we have argued that the neoliberal development cycle started in the late 1970s has been, and still is, based on a model of development that has proved to be unsustainable from the economic, social, and financial points of view. In addition we have seen by comparing the neoliberal cycle of development with the preceding ‘Keynesian’ cycle of development (in the Bretton Woods period) that these three dimensions of sustainability deteriorated in the second period. In this section we discuss whether the neoliberal model of development may be considered sustainable from the environmental point of view.

The apparent correlation between the indices describing environmental sustainability and the adoption of neoliberal policies is puzzling. While the wave of the neoliberal paradigm mounts and spreads in the 1970s and 1980s we may observe a contemporaneous wave in the adoption of environmental policies. As a matter of fact systematic environmental policies have been inaugurated in the 1970s for the first time in history and have gathered momentum in most developed countries in the 1980s and in the early 1990s. Unfortunately this wave has started to lose strength in the late 1990s and has progressively receded in the new Millennium notwithstanding the growing scientific evidence on the dramatic environmental unsustainability of the existing development model made evident above all by global warming. Notwithstanding all its shortcomings, however, environmental policies obtained a few remarkable successes in the past

⁴ Examples of shadow banks include finance companies, asset-backed commercial paper (ABCP), conduits, structured investment vehicles (SIVs), credit hedge funds, money market mutual funds, security lenders, limited-purpose finance companies (LPFCs), and the government-sponsored enterprises (GSEs).

decades. Should we credit them to the neoliberal model of development? I will suggest a tentative answer at the end of this section to draw indications for a more sustainable policy strategy.

3.1 The optimism of neo-liberal economists and the environmental Kuznets Curve

Most liberal economists have played down the gravity and urgency of environmental problems as they believe that unfettered markets have been and will continue to be able to solve them in the best possible way and in the shortest possible time. Whatever attempt to reach better environmental targets within a shorter time horizon is seen as a dangerous and ultimately counterproductive interference with market self-regulation.

Within the liberal camp two different approaches have to be distinguished having significantly different policy implications. According to the updated liberal approach developed by Pigou (1920), real markets are intrinsically unable to take account of many sizeable costs and benefits related to environmental choices since their value is often ignored or incorrectly registered by market prices. The market may succeed to reach the optimal equilibrium only if these 'externalities' are internalized through environmental taxes or tradable pollution permits. This point of view provided the foundations of (neoclassical) environmental economics that inspired the environmental policies adopted at the end of the past millennium and, in part, still in the current one. The neoliberal stance that became hegemonic since the late 1970s, however, never took seriously the Pigouvian approach maintaining that the environmental externalities are not particularly significant and may be better managed by completing the markets and defining the property rights on environmental resources (Coase, 1960). In any case in this view the use of environmental taxes should be avoided because it is impossible to measure correctly the environmental costs of economic decisions so that new taxes would further distort decentralized choices. A better policy instrument, in their opinion, is offered by tradable pollution permits that define the property rights of polluters on natural resources. Their definition and management, however, is likely to produce damaging interferences with the markets that could be worse than the external costs to be internalized. In the end the neoliberal point of view is sceptical about the potential of environmental policy and tries to reduce its scope and impact.

The main scientific support to this extreme laissez-faire perspective is based on the empirical work based on the so-called 'Environmental Kuznets Curve' (EKC) claiming that in many cases the indexes of environmental deterioration increased in the first phase of industrialisation eventually declining after a peak (among the early contributions see Panayotou, 1993; Grossman, and Krueger, 1993; Selden and Song, 1994; Shafik, 1994; for a critical assessment see, e.g., Borghesi and Vercelli, 2008). It has been argued that this trend characterizes the level of many environmental pollutants, such as sulphur dioxide, nitrogen oxide, chlorofluorocarbons, and other chemicals released directly into the air or water. The explanation of this alleged empirical regularity relies on the evolution of the productive structure in an industrializing country that typically develops first the heavy industry that is highly polluting, then the light industry and finally the sector of services that are less polluting. In addition, it is assumed that after a certain threshold a growing pressure is exerted on governments in favour of green policies. If the EKC were corroborated by the empirical evidence we should expect that the spontaneous evolution of markets would eventually solve the environmental problems originated in the early stages of industrialization. Unfortunately the empirical evidence corroborates the hypothesis only for a limited number of indicators such as sulphur dioxide that is responsible for acid rain, or particulate matter that is responsible for serious respiratory diseases including lung cancer. In both cases the nexus between cause and effect was clear and direct and called for early policies that succeeded to reduce the emissions of these pollutants. In other cases a new wave of environmental deterioration has been observed in recent years as in the case of coliform bacteria concentration in freshwater that seems to be the effect of a weakening of the policies directed to safeguard the quality of water. Moreover, there is little evidence that the relationship holds true for other pollutants, for natural resource use or for

biodiversity conservation. For example, while the ratio of energy and real GDP has fallen, total energy use is still rising in most developed countries. In addition, the status of many key ecosystem services provided by ecosystems, such as freshwater provision and regulation, soil fertility, and fisheries, have continued to decline in developed countries. Moreover some of the most important indicators of environmental deterioration, such as the emission rate of GHGs, are continuing to grow at the upper margin of the IPCC scenarios without any sign of inversion (figure 4).

Figure 4 about here

We have to conclude that the EKC is not general and robust enough to justify optimistic expectations independently of a specific policy strategy. In addition, also when it works, the inversion of the pollution trend is explained by systematic policy interventions meant to curb the specific source of pollution. The shortcomings of the EKC depend on the fact that, generally speaking, environmental deterioration depends not only on per capita income but also on other factors, in particular demographic and technological factors.

3.2 The ecological footprint and the crisis: a tale of two debts

The pessimistic view on the environmental sustainability of the spontaneous evolution of unfettered markets is confirmed by the empirical evidence produced by the ecological approach. We refer here to a comprehensive measure of ecological sustainability of which we have sufficiently long series: the ecological footprint,⁵ a standardized measure in global hectares of the amount of biologically productive land and sea area necessary to supply the resources consumed and to assimilate waste (Wackernagel and Galli, 2007). The ecological footprint has rapidly increased since WWII.

Figure 5 about here

Since the early 1980s we notice a slowdown due to the systematic adoption of environmental policies (see figure 5). This was insufficient to avoid that since the late 1970s our planet drifted in a situation of increasing ecological debt: “The fact that we are using, or ‘spending’, our natural capital stocks faster than they can be replenished is similar to having expenditures that continuously exceed income. In planetary terms, the costs of our ecological overspending are becoming more evident by the day. Climate change—a result of greenhouse gases being emitted faster than they can be absorbed by forests and oceans—is the most obvious and arguably pressing result. But there are others—shrinking forests, species loss, fisheries collapse, higher commodity prices” (Global Footprint Network, 2013, p.1). One graphic way to measure the extent of ecological debt is that of calculating the Earth Overshoot Day, i.e. the approximate date our resource consumption for a given year exceeds the planet’s ability to replenish: “In 1993, Earth Overshoot Day...fell on October 21. In 2003, Overshoot Day was on September 22. Given current trends in consumption, one thing is clear: Earth Overshoot Day arrives a few days earlier each year” (*ibidem*). In 2013 the Earth overshoot Day has been calculated to be August 20.

This situation of growing ecological debt has interacted and interacts with the situation of growing economic debt of states and households that has characterized the neoliberal development cycle. The deep impact of this interaction has become evident in the origination of the subprime crisis. The ecological debt revealing the overexploitation of natural resources by an unsustainable model of development reflected itself in a spike in the price of oil and food from 2005 to 2008 (see retro figure 2) that interacted perversely with the over-indebtedness of households having a subprime or ARM contract. The Fed reacted to the first signs of inflation induced by the sharp increase in the

⁵ A thorough assessment of the scope of the measure of ecological footprint as compared to that of alternative comprehensive environmental indexes may be found in Galli et al. (2012).

price of oil and food by increasing the discount rate without taking into account the fact that it had been brought about by cost inflation. The Fed defended itself by claiming that the increase in the discount rate affected short-term rates of interest rather than the long-term interest rates involved in mortgage payments; however the empirical evidence clearly shows that also long term rates of interest were affected, though at a lesser extent (see retro figure 3).

The perverse interaction between financial and environmental sustainability observed in the period 2006-2008 should not be considered as a mere accident but rather as an example of a more general issue that tends to become more and more relevant for sustainability. In the absence of a radical policy change we should expect for the future increasing financial instability produced by unfettered financialisation and, at the same time, a growing tendency to cost inflation induced by the progressive depletion of renewables, and the internalization of external costs through green taxation and/or tradable pollution permits.

3.3 The unsustainability of the energy system

The point of view of the ecological imprint showing a tendency towards increased unsustainability after WWII is confirmed also by detailed studies using alternative methodologies. We restrain here to one of these analytic approaches applying it to a crucial sector that heavily affects the sustainability of the existing model of development.

The growing environmental unsustainability of the last decades crucially depends on the current energy system based on fossil fuels altering the climate: within this model of development the mere stabilization of GHGs emissions implies the halving of the world GDP growth from about 4% to 2% (Borghesi and Vercelli, 2009). This is far from sufficient to stabilize the climate. Since the current emissions are more than 8 times what may be absorbed by the biosphere, GDP growth should be severely negative for many decades before reaching the sustainable value. This would be unimaginable within the current model of development.

It is possible to clarify the quantitative dimensions of this delicate issue by adopting a decomposition approach. According to the approach suggested long ago by eminent ecologists (Holdren and Ehrlich, 1974), the impact I of human activity on the quality of the environment depends on Population P , Affluence A and Technical change T . This idea may be expressed in rigorous terms by factorizing the growth rate of an index of environmental deterioration in a number of determinants. We may derive the following identity:

$$ED \text{ growth} = pc \text{ income growth} + \text{intensity of } ED \text{ growth} + \text{population growth}$$

where ED is a global index of environmental degradation; pc is for *per capita*. From this identity we may derive a simple minimal condition of long-term global environmental sustainability ($ED \text{ growth} \leq 0$):

$$pc \text{ income growth} \leq - (\text{intensity of } ED \text{ growth} + \text{population growth})$$

This condition clarifies that a positive rate of growth of $pc \text{ income}$ may be sustainable only if the rate of growth of population does not exceed the negative rate of growth of $ED \text{ intensity}$. This condition may be satisfied only if the process of technical change is intense and focused on increasing sustainability and the structure of demand evolves in a greener direction. This is more likely to happen in developed countries where environmental awareness and technical progress are typically higher and demographic growth lower. However, even in the developed countries most aware of sustainability constraints, it is very difficult to comply with the conditions of sustainability. This is certainly true in the energy field. As is well known, the existing energy system is based on the consumption of fossil fuels that are heavily polluting and subject to a strong scarcity constraint.

The current emissions of greenhouse gases G are 42 GtCO₂-e per year while the biosphere may absorb only about 5 GtCO₂-e per year without increasing their concentration in the atmosphere.

This produced a growth in the concentration of GHGs in the atmosphere⁶ increasing the average temperature of 0.85 degrees Celsius over the period 1880 to 2012 (IPCC, 2014). To avoid a further increase in the average temperature of the biosphere, the GHGs emissions should be rapidly reduced to less than 1/8 of its current value. On the contrary, the current projections under the 'business as usual' scenario predict a further growth of emissions in the next decades that will bring about a further increase in the average temperature exceeding the conventional threshold of 2° beyond which the consequences are expected to be catastrophic. Unfortunately, the decomposition approach introduced above shows that even the intermediate objective of emissions stabilization is very difficult to reach. The energy intensity is diminishing at a rate of about 2% per year but the world population is still growing at about 1% per year while the emission intensity of fossil fuels is currently increasing because of the substitution of coal for less polluting but scarcer oil and natural gas (Borghesi and Vercelli, 2009). Within the existing model of development the mere stabilization of GHGs emissions may be obtained only through a significant reduction of per capita income growth. The climate may be stabilized only by shifting from the current model aimed to maximize GDP growth to a model of sustainable development based on a different energy system relying mainly on renewable energy sources and complying with the other social and environmental requisites of sustainability.

3.4 Environmental sustainability and the neoliberal paradigm

The relationship between the neoliberal model of development and environmental sustainability is difficult to assess because the parable of environmental policy has been largely independent of the neoliberal policy strategy at least up to the late 1990s. We start from the observation that in the Bretton Woods period the empirical evidence is consistent with a fairly good performance as far as economic, financial and social sustainability are concerned, though arguably insufficient in absolute terms. On the contrary its performance in the field of environmental sustainability has been extremely negative. As a matter of fact the unprecedented average rate of growth in developed countries produced a rapid worsening of the environmental problems that assumed a global nature for the first time in history. A growing awareness of the nature and gravity of the environmental problems starts to emerge in the 1970s. An early contribution that raised the environmental awareness was *The Limits to Growth* (Meadows et al., 1972). The book was heavily criticized as undervaluing the stabilizing role of price flexibility and technical progress and for relying on unreliable data and arbitrary functional forms. However in consequence of this and other important contributions (in particular the report of WCED, 1987, that introduced the concept of sustainable development) the tide of public opinion was sufficiently aroused to exert a significant pressure on policy. In the 1980s a systematic and fairly organic environmental policy was introduced in the USA, Germany and then in most developed countries.

The recent assessments converge toward the disturbing consensus that the business-as-usual projections of the book tend to become true (see in particular Turner, 2008). Bardi (2011) concluded his recent reappraisal of *The Limits to Growth* by asserting that "The warnings that we received in 1972 ... are becoming increasingly more worrisome as reality seems to be following closely the curves that the ... scenario had generated." (p.3).

The environmental policy obtained a few significant successes not only at the local level but also on a few global problems such as acid rain and the thinning of the ozone shield. But these steps forwards remained limited to global issues impinging on local population that was thus stimulated to exert pressure on local governments to mitigate the negative externalities. On the contrary, some of the crucial global factors producing global externalities, such as the loss of biodiversity or

⁶ In particular the concentration of carbon dioxide, the most important greenhouse gas, has exceeded the pre-industrial level by about 40% (IPCC, 2014).

climate change, remained insufficiently mitigated by policy measures. In many cases, after a promising start in the early 1980s the commitment of governments on international treaties faded away since the late 1990s. A case in point is the Framework Convention on Climate Change (UNFCCC) agreed in 1992 during the UN Conference on the Environment and Development held in Rio de Janeiro. After an increasingly complex negotiation, in 1997 the parties agreed on the text of the so-called Kyoto Protocol fixing emissions targets for developed countries. Only in 2002 was reached the ratification threshold that brought the UNFCCC treaty into effect on 16 February 2005. However in the meantime the US that is responsible for more than one-third of the world GHGs emissions and signed the protocol in 1997 did not ratify the treaty while other countries such as Canada later withdrew from it. During the first commitment period (2008-2012) the application of the Protocol resulted thus to be increasingly weak and inefficient (a case in point is the effective management of the EU system of tradable permits). Finally the second period of commitment (2013-2020) has not started yet in absence of a sufficient convergence towards a new agreement and will not start before 2015. The weakening of environmental policies since the late 1990s is visible in most countries on many environmental issues and has been strengthened as recently in consequence of the financial crisis and the ensuing great recession. Not surprisingly the arguments used to withdraw from a serious environmental policy are exactly those underlying the adoption of the neoliberal policies: the environmental policy measures disturb the mechanisms of self-regulation of markets which if undisturbed would solve spontaneously also the environmental problems in the most efficient way. We may conclude that the wave of environmental policy started in the 1970 increasingly collided in the 1980s and 1990s with the principles of neoliberal policies eventually succumbing to them. We cannot hope in a revival of the original strength of environmental policies unless the neoliberal general policy paradigm will be abandoned.

3.5. Technological and development trajectories

We have discussed so far the sustainability of different development models and of their realization in specific historical trajectories, focusing mainly on the neoliberal trajectory. We did not consider so far the technological side of development that has played and plays a crucial role in the determination of actual development trajectories. In order to integrate this crucial factor in the analysis, in this section we hint at the crucial interaction between technological and development trajectories. The nature and implications of technological trajectories has been extensively studied by a huge literature. We find in it a wide agreement that these trajectories are initiated by technological revolutions, but there is a different understanding of the precise nature, chronology, even the number of such revolutions. Limiting myself to mention two recent best-sellers, I notice that according to Jeremy Rifkin (2011) the times are ripe for a third Industrial Revolution, while according to Carlota Perez (2002, 2009) the last technological revolution started in the 1970s is the 5th after the 'Industrial revolution' of the 18th century, and has to enter now in a phase of more harmonious deployment. Notwithstanding these significant differences these two authors and most other researchers working on the nexus between the evolution of technology, economics and society, agree that the current technological trajectory is heading or should head towards a new sustainable process of development. According to Rifkin (2011) the creation of a renewable energy regime, partially stored in the form of hydrogen, distributed via a green electricity grid, and connected to plug-in, zero-emission transport will lead to a sustainable economy characterized by the democratization of information, energy, manufacturing, marketing, and logistics. Analogously in Perez's (2002, 2009) view the civil society has been empowered by technology of the capability to create favourable conditions for a sustainable global knowledge society.

In what follows I limit myself to refer to the neo-Schumpeterian literature, and in particular to the recent contributions by Perez (2002, 2007, 2009), since her approach is rooted in this prestigious tradition and may be considered as complementary to that here pursued lending itself to what we believe to be a fruitful integration. In Perez's (2009) view each industrial revolution triggers "a basic stable sequence: irruption of the revolution, two or three decades of a turbulent *installation period* ending in a major bubble collapse, then a recomposition of the socio-institutional framework that regulates finance and sets the conditions for the final "*deployment period*, a time of more organic growth that lasts until maturity and exhaustion are reached, setting the stage for the irruption of the next technological revolution" (p.781). The period of installation of the new techno-economic paradigm is a phase of Schumpeterian 'creative destruction' forced by the tentative introduction of new technologies and business models. In this period the investment is dominated by finance since "it is the high mobility of finance that will then enable the reallocation of available funds from the established and mature technologies and industries to the emerging ones" (ibidem). The installation period typically ends in consequence of a deep and prolonged crisis that occurs about midway the technological trajectory triggered by each technological revolution. Each of these crises was triggered by one or more bubbles: major technology bubbles (MTB) driven by a technology opportunity pull and financial bubbles driven by easy credit push: "in the first case it was the excitement about new technology that attracted the money into the casino...; in the second it was the excitement about abundant easy money that pushed investors to get credit and to seek new objects of speculation" (Perez, 2009,p.794). The two kinds of bubbles are strictly connected and intertwined although their occurrence may be separated by a few years as in the most recent surge of development. The period of deployment of the new paradigm after the crisis has to be a phase of 'creative construction' characterized by a recomposition of the contradictions between the development of productive forces and the social relations of production. This is made possible by a re-regulation of finance and the ensuing shift of investment from finance to the real economy.

In this view the periods of financialisation are recurrent phases that are associated with pathological consequences such as economic turmoil, financial speculation, shift of investment from the real economy to finance. According to Perez (2009) in these periods the financial sector plays the physiological role of facilitating the structural changes required by the introduction and diffusion of new technologies. The First financialisation has been instrumental to the introduction and diffusion of the age of automobile, oil, petrochemicals and mass production, while the Second financialisation facilitated the introduction and diffusion of the new techno-economic paradigm based on information and digital communication. The first phase of creative destruction culminating in the roaring 1920s led to the Great Depression, while the phase of creative construction in the period of Bretton Woods was permitted by a strict control and supervision of finance, and implemented through Keynesian full-employment policies and the progressive construction of the welfare state. The recent phase of creative destruction started in the late 1970s led to a double bubble: the dot.com mania collapsing in the years 2000-01 and the housing mania triggering the subprime mortgage crisis in 2007. What is now required is a new phase of more harmonious growth that "will depend on the capacity of the State to restrain the financial casino... and to hand over power to production capital, allowing its longer term horizons to guide investment once more " (p. 790).

This very concise synthesis of Perez's view on technological trajectories suggests that they are to some extent synchronized with the development trajectories as reconstructed by Vercelli (2011) provided that we take into account that the two trajectories are out of phase by half 'cycle'. Perez's (2009) technological trajectory is divided in two phases by a 'great crisis', while my suggested notion of development trajectory emerges as a reaction to a great crisis succeeding in the first phase to support a relatively harmonious development while the exhaustion after a few decades of its propulsive potential leads to its second phase of gradual deterioration leading to a new great crisis

(see Vercelli, 2011). The reconstruction of the actual historical evolution from these two points of view is broadly consistent and should be integrated (see figure 6).

Figure 6

Starting from the long depression of 1873-1896 in the UK, the leading industrial country affecting the other main industrial countries, a new development trajectory started by extending systematically the laissez faire policies to the international relations and fostering the First globalization and the synergic process of the First financialisation. From the technological point of view the deployment of the 'age of steel and heavy engineering' is completed in this period while a new technological revolution is incubated eventually leading to the era of automobiles, oil and petrochemicals based on the Fordist model of production. The emblematic date of its big bang according to Perez (2002, 2009) is 1908 when the most celebrated early model of gasoline car, the Ford model T, started its production. The roaring 1920s are identified as the major technology bubble of this technological trajectory that terminates the turbulent times of its installation leading to the Great Depression. The response to this economic and social catastrophe initiates a new cycle of development based on the adoption of full employment Keynesian policies and the building of the welfare state. This allows a phase of more harmonious development characterized by the deployment of the dominating technological paradigm. The latter starts to decline since the late 1960s in consequence of the growing turmoil in market of labour and industrial relations while a new post-Fordist technological paradigm based on mass consumerism, flexible specialization and a revival of small business starts to emerge. In my view the Great Stagflation of the 1970s ends the development trajectory of the Bretton Woods period leading to a new neoliberal development trajectory. This is conducive to the deployment of the previous technological paradigm, while mass consumerism shifts towards ICT appliances starting the age of information and digital communications. Its diffusion is favoured by the second globalisation and financialisation leading to the major technology bubble of the Internet mania in late 1990s originating the dot.com crisis. The shift of investment from immaterial goods to brick-and-mortar goods and the regime of easy liquidity fostered by Greenspan, soon imitated by other central banks, nurtured the illusion of controllability of economic activity simply through appropriate monetary policies. This fostered the housing bubble in 2003-2007 that ended in the subprime financial crisis triggering the Great Recession. The latter is thus the consequence of a creative destruction period triggered by a technological revolution based on the systematic introduction of ICT. The Second financialisation occurring in the same period is seen as functional to its implementation providing the necessary structural flexibility that allows the introduction of the new technologies, although the collateral effects briefly reviewed in section 2 proved to be eventually catastrophic.

The reconstruction here sketched of the lagged synchrony between technological and development trajectories is broadly consistent with Perez's (2002, 2009) account of technological great surges with a major difference: she does not consider the Great Stagflation as relevant for her analysis. However, its role is crucial not only to explain the genesis of the new neoliberal cycle of development (see retro section 2.1) but also to understand the significant changes in the prevailing model of production and distribution of goods and services occurred in the same period. The technological response to such a crisis relied on the model of flexible specialization and the revival of small and medium businesses in the 1970s and 1980s. This new technological and organizational paradigm was instrumental to the early take-off of ITC. This new tendency, however, petered out in the late 1990s since, as has been pointed out by Perez (2012) herself, "the availability of cheap energy in the 1990s and of cheap Asian labor, then and in the 2000s, enabled the old mass production model ... to be perpetuated, even in the ICT industries." (p.4).

4. Policy implications

The argument developed in the preceding sections has far-reaching policy implications. The unsustainability of the current trajectory of development calls for its radical transformation in the direction of a new model of development complying with the requisites of sustainability. In order to provide some useful suggestions directly descending from the preceding analysis, section 4.1 summarizes why the current model of development has to be considered as unsustainable, while in section 4.2 a few constructive suggestions are advanced to start a path of recovery much more robust and sustainable.

4.1. The unsustainability of the neoliberal model of development

Sections 2 and 3 argue that the neoliberal model of development is unsustainable from the economic, financial, social and environmental points of view. Its alleged successes in the early 1980s, in particular the rapid disinflation and the flattening of Phillips curve, were obtained through a harsh redistribution of income and power from workers to entrepreneurs. The greater flexibility in labour markets and industrial relations was obtained by increasing the precariousness of jobs and by reducing the rights of workers. What was considered to be a success for the economy as a whole, and was certainly seen as a success by most entrepreneurs and shareholders, was an epoch-making defeat for blue collars and white collars that started the decline of the middle classes. Moreover, this alleged success from the point of view of macroeconomic performance was obtained only at the cost of serious collateral effects that in the longer period would have provoked the outbreak of the recent crisis. First of all the transfer of power from labour to capital soon translated in an analogous transfer of income and wealth within most OECD countries and many developing countries adopting similar policies. The indexes of inequality in the distribution of income started to increase since the late 1970s and continued the upward trend until now (Stiglitz, 2012; Picketty, 2014). In addition the increasing inequality often reflected growing poverty also in the richest countries (including the US and many European countries). The basic conditions of social sustainability have thus been systematically violated during all the period. This had a significant impact also on economic sustainability as measured by the growth of GDP. The stagnation of the aggregate income of middle and lower classes consequent to the increase in inequality and poverty brought about a persisting stagnation of aggregate consumption. Since also the aggregate investment in the real economy tended to stagnate, if not subside, in consequence of the process of financialisation, the ensuing stagnation in aggregate private expenditure tended to slowdown the rate of growth of GDP. The increasing indebtedness of households and the growing contribution of finance to GDP were insufficient to compensate for the downbeat factors summarized above while financial fragility and systemic risk progressively worsened. The process of financialisation also undermined environmental sustainability by crowding out investment from the real sector and by enhancing the short-termism of economic choices including those referring to investment. The consequence was that the investment necessary for greening the economy has been insufficient; in particular the investment in research and development necessary to promote environmental innovation has been inadequate. Big banks preferred to continue to finance the huge investment in the field of fossil fuels (infrastructures, exploration, transformation, transport and so on) by profiting also of the public incentives still higher than in the field of renewable energy sources. The investment in the field of renewable energy has been much more fragmented in a myriad of small amounts distributed on the territory that banks considered much less appealing for their alleged small contribution to their returns on equity.

The neoliberal policies produced a perverse interaction between social, financial, economic and environmental problems. This brought to an end the era of 'great moderation' claiming to have overcome the inflationary bias of the Bretton Woods period originating in the market for labor and

in the distributive struggle between workers and entrepreneurs. The new regime was eventually haunted by a dual inflationary bias, one in the financial sector in consequence of asymmetric monetarism and one in the real sector because of an over-exploitation of scarce natural resources such as oil. The peak of oil price in the period 2005-2008 should not be interpreted as an erratic shock, but rather as the signal of an unsustainable energy system, largely based on the use of exhaustible and polluting fossil fuels that are the main cause of the ongoing climate change process (Borghesi and Vercelli, 2008, 2009). Even taking non-conventional oil sources into account, most studies estimate that oil production should reach its peak in the near future, thus forcing the economies along the declining part of the so-called Hubbert curve (*ibidem*). In the absence of appropriate policy measures that may speed up the necessary transition towards the systematic use of renewable energy sources, the sensitivity of oil price (and that of its substitutes) to demand increases is likely to become an insurmountable obstacle to the sustainability of a business-as-usual economic recovery. An expected increase in aggregate demand would accelerate the upward trend of the oil price, leading to a significant surge of cost inflation, and consequently of the rate of interest, that would hinder and possibly interrupt economic recovery.

4.2 Constructive suggestions

From the critical analysis of this paper as summarized in section 4.1 descend a few constructive suggestions on the structural modifications required to re-orient the process of development in a more sustainable direction.

First of all policy makers should be concerned with social sustainability struggling hard to reduce inequality and poverty. The concept of sustainable development as defined by the Bruntland Commission (WCED, 1987) is rooted in a principle of equity applied to the intertemporal distribution of resources among successive generations, a principle that -for the sake of ethical coherence- must be applied also within the current generation. In addition an extensive corpus of empirical research demonstrated that less inequality is strictly correlated with more happiness and better health (see a critical survey of this literature in Borghesi and Vercelli, 2012). It is therefore important to support social sustainability through effective redistribution policies that can reduce inequality and poverty (Sachs, 2005; Stiglitz, 2012). To obtain more equality an effective progressivity of taxation, that has been greatly weakened if not reversed in the last decades, should instead be restored keeping in mind that this principle has been advocated also by the founding-fathers of liberalism (in particular Smith, Stuart Mill and Marshall). The neo-liberal belief in the existence of a trickle-down mechanism inbuilt in the market that would propagate wealth from the richest people to all the other layers of society has not been confirmed by the empirical evidence (see Stiglitz, 2012). Therefore the system of systematic transfer of wealth, access rights and social security that goes under the name of welfare state should not be dismantled but rather reconstructed in a more robust and sustainable way. One could wonder, however, whether equity, and thus the goal of a reduction of inequality and poverty, is an ethical goal that may jeopardize the efficiency of markets. On the contrary a market can be really competitive only if all competitors have access to all the relevant opportunities. Otherwise the winners of the myriad of competitions which constitute a free market will not be the best competitors but rather those having the greatest power or wealth to begin with. Moreover they will use the proceedings of their market wins to further increase their market power and thus their relative advantage over the other competitors. In this case the allocation of resources is not optimal and could be improved through a more egalitarian distribution of resources. In a society strongly affected by inequality and poverty the competition in unfettered markets resemble more the Darwinian competition than a fair competitive market as dreamed by Adam Smith, Stuart Mill, and Marshall. In addition genuine competitive markets as conceived by the founding fathers of liberalism require a strict regulation that assures the continuous implementation of the “rule of law”, the repression of monopolistic practices, conflict of interest,

fraud and whatever behaviour alters the conditions of fair competition. CSR itself cannot be left only to the self-regulation of enterprises but has to be promoted and enforced by the legal system (Borghesi and Vercelli, 2008). The inevitable conclusion is then that social sustainability is a necessary condition of economic sustainability, even if we conceive economic sustainability in the reductionist sense of economic growth theory (sustained steady growth of the GDP).

The conclusions reached above would be further strengthened by the adoption of better indexes of economic sustainability. As is well known, the GDP is a misleading index of wellbeing since it does not include the quality and consistency of social and environmental capital while it includes many spurious items (such as defensive expenditure). The need for a new sustainability-based economic paradigm and new welfare measures is confirmed by the observed gap between the growth indicators and the happiness of individuals (Ng, 2003; Borghesi and Vercelli, 2012). Beyond a minimal threshold of per capita yearly income (~\$10,000) wellbeing and health mainly depend on social and environmental capital. We have thus to abandon the fetishism of GDP growth adopting instead more comprehensive and reliable welfare indexes that may better capture the capacity of the economic system to sustain itself in the long run (Helliwell et al., 2012; Stiglitz et al., 2010).

Unfortunately, according to most indicators also the consistency and quality of environmental capital is rapidly deteriorating since WWII. The crucial problem is the ongoing rapid climate change originated mainly from the characteristics of the current energy system based on the use of fossil fuels. As we have seen in section 3.3, to avoid a further increase in the average temperature of the biosphere, the GHGs emissions should be rapidly reduced to less than 1/8 of its current value. Within the existing model of development a reduction of GHGs emissions may be obtained only through a significant reduction of the rate of per capita income growth. Environmental sustainability has to be supported in all its multiple dimensions (Stern, 2007; Borghesi and Vercelli, 2009). The climate may be stabilized only by accelerating the transition from the current model aimed to maximize GDP growth to a model of sustainable development based on a different energy system relying mainly on renewable energy sources and complying with the other social and environmental requisites of sustainability.

It has been suggested so far that a few structural changes would implement social, economic and environmental sustainability. However none of the measures suggested above, nor analogous measures that could be suggested, would be implemented without acting before, or at least contemporaneously, on the sustainability of the existing financial sector. As we have seen, the radical elimination of any constraint to cross-country flows of financial capital implemented since the early 1980s has promoted a process of financialisation that has impaired sustainability in a crucial way. In particular it has shifted investment from the real sector to the financial sector and has much increased the short-termism of economic choices that reduces the weight of future benefits to a very little amount. Sustainability requires a systematic policy strategy aiming to the repression of the negative externalities originated in finance. This requires apt control and regulation policies meant to reduce its vulnerability and moderate its excessive influence on the social and economic decisions (Stiglitz, 2010). The first objective to pursue is an effective downsizing of finance in relative terms. This may be obtained through a coordinated set of measures. The adoption of a financial transaction tax is expected to reduce significantly speculation without affecting the flows of capital to support the real economy. In addition the idea of universal banking should be abandoned in favor of a new compartmentalization between investment and commercial banking recovering the basic principles of the 1933 Glass-Steagall Act to reduce the conflict of interest between the two activities, updating it to the new features of finance. Analogously the activity of revision of balance sheets should be sharply divided from the activity of rating eliminating the conflicts of interests that greatly contributed to the recent financial turmoil. Compartmentalisation would contribute to the downsizing of big banks, in particular those having a turnover superior or comparable to the aggregate income of the states where they operate. In any

case a strict dimensional cap should be fixed to avoid monopolistic and oligopolistic practices, manipulation of the market, excessive influence on governments and legislators and regulatory capture. In this way the scourge of banks too big to fail would be eliminated at its root. Not only should the regulation of financial markets become much more stringent but also their supervision that should extend to over-the-counter derivatives and shadow banking. The transparency of all financial decisions should be strictly enforced to assure the informational efficiency of financial markets and the effectiveness of legal regulation and supervision. This implies that off-balance sheet operations and shadow banking (as we know it) should be strictly forbidden. Analogously the off-shore centres should be proscribed. These and other measures should be aimed to repress speculation and finance for its own sake (e.g. proprietary trading and purchase of own shares) conditioning finance to develop its contribution as essential support to the real economy and in particular to investment enhancing the sustainability of development.

The analysis of the interaction between the technological and development trajectories confirms that to exploit the potential of the new ICT techno-economic paradigm, its disruptive effects should be reconciled with the social conditions of production and individual wellbeing as it has happened for other technological trajectories before. In the installation period (1971-2007) the new ICT techno-economic paradigm has been fully exploited by finance to realize a fully global market open 24 hours per day. High-frequency trade made possible by computers and Internet greatly increased the scope of speculation and its negative impact on the world economy. The ICT sector is at the same time part of the problem, i.e. the unsustainability of the existing development trajectory, and part of its solution. It is today the most rapidly growing contributor to waste generation because of the range and short lifespan of digital devices (Global connectivity group, 2013). Current arrangements for the disposal of electronic waste, some of which is toxic, are wanting (ibidem). The greenhouse gases' emissions of the ICT sector are increasing at a rate of 6% p.a. in consequence of the energy used as a result of the diffusion of ICT networks and devices, and the extent of their use. On the other hand we may figure out a beneficial use of ICTs not only to access and elaborate information, but also to enable social and business relations contributing to develop a more sustainable knowledge society. Also the environmental sustainability may be improved by the use of ICTs. Big companies, particularly utilities, have begun to use information technology to manage energy production and distribution, transport and other large-scale systems, with greater energy efficiency (ibidem). The impact of 'dematerialization' of some goods such as books and music, and shifts towards home-working and e-commerce is more controversial, since the energy costs of travel that are saved may be lost through increased heating or conditioning costs at home. (ibidem). It is now urgent to exploit the great potential of ICT in the direction of a more harmonious and sustainable development trajectory. To this end the vicious circle between introduction of ICT, financialisation and globalisation should be interrupted by incentivizing innovative ICT investment in the real economy to improve the job contents of work, full employment, dematerialized consumption.

5. Concluding remarks: how to get out of the crisis in the right direction

In the past a durable escape from a great crisis has typically been found through a radical change of direction in the development trajectory on the basis of a new development model. As a matter of fact, in the last 150 years a development trajectory has always started after a great crisis as a response to it. This is because the blame of the crisis has been typically put on the preceding model of development of which the previous trajectory was seen as a realization. A new model of development has been thus suggested in the conviction that it could overcome the shortcomings of the preceding model (Vercelli, 2011). Therefore, as soon as the new model had become hegemonic a new development trajectory started that was believed to realize the new model in the best possible way. This is what happened after the last two great crises. The reaction to the Great Depression led to the abandonment of the previous laissez-faire policy strategy considered responsible for the crisis

and to the adoption of a Keynesian policy strategy. The Great Stagflation of the 1970s led to the abandonment of Keynesian policies believed to be responsible for it, and the adoption of a neoliberal policy strategy that proved to be more dogmatic than the traditional liberal strategy. The reaction to the Great Recession instead, after a brief and instrumental revival of the Keynesian and Minskyan policy approaches in 2008-2009, did not lead so far to the much-needed radical change of direction in the development trajectory but, particularly in the Eurozone, to a more extreme and rigid version of the neoliberal model of development that is further worsening its unsustainability. The analysis of the technological component of the development trajectory confirms the need for a radical change of the development model to allow a full exploitation of the potential of the ICT and flexible specialization to realize a sustainable knowledge society. After the period of creative destruction associated to the installation of the ICT techno-economic paradigm what is now needed is to start a phase of creative construction to realize a more harmonic deployment of this paradigm able to overcome its past contradictions with social and environmental sustainability (Perez, 2009). The transition to a different techno-economic trajectory of development and its rapidity crucially depend on the size and structure of investment to promote a socially responsible green economy, the sustainability of towns and transports, the health, education and culture of citizens. This presupposes a severe repression of speculative and self-indulgent finance to shift investment towards sustainable and productive uses. To this end what is needed is a new policy strategy restoring the primacy of human, social and environmental goals over unqualified growth of GDP and an institutional framework providing an efficient mix of incentives towards productive investment generating sustainable development, and disincentives to unproductive and speculative financial investment. As in all the previous techno-economic waves, its harmonious deployment requires the crucial support of public institutions providing a long-sighted vision, coordination of private and public investment decisions, insurance and mired financial support to risky investment that might contribute to sustainable development (Mazzucato, 2013). We have thus to radically change route rather than persevering in the old business-as-usual policies that jeopardize the wellbeing of most individuals worldwide.

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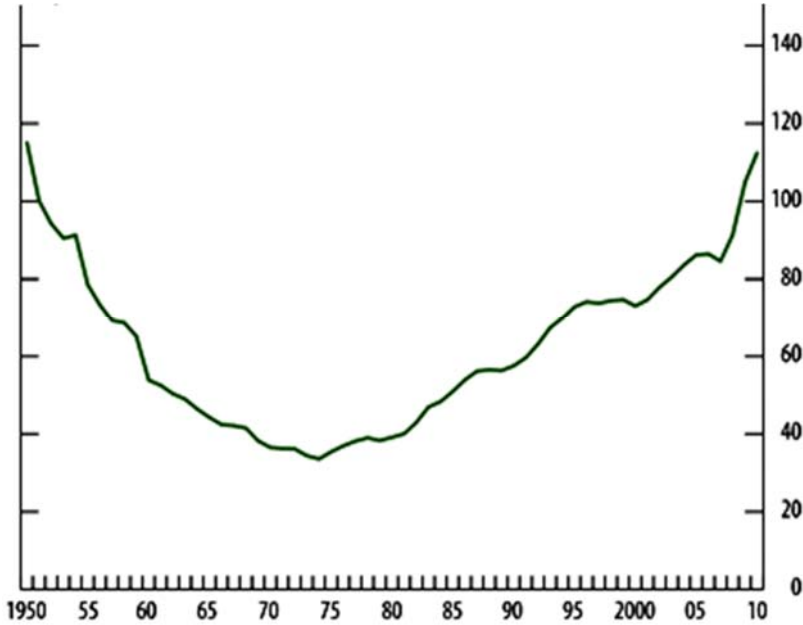
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Figure 1 – Sovereign debt to GDP in the G-7 (%)



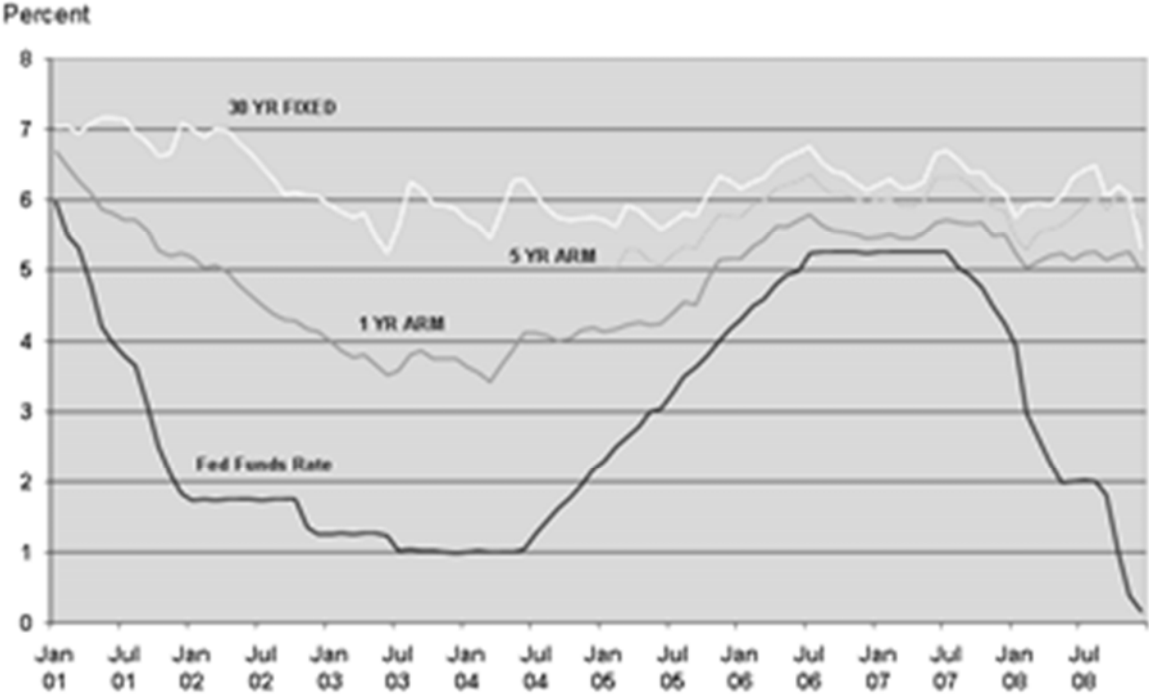
Source: IMF, GFSR, Apr. 2010.

Figure 2 – Food price and oil price (2000-2010)



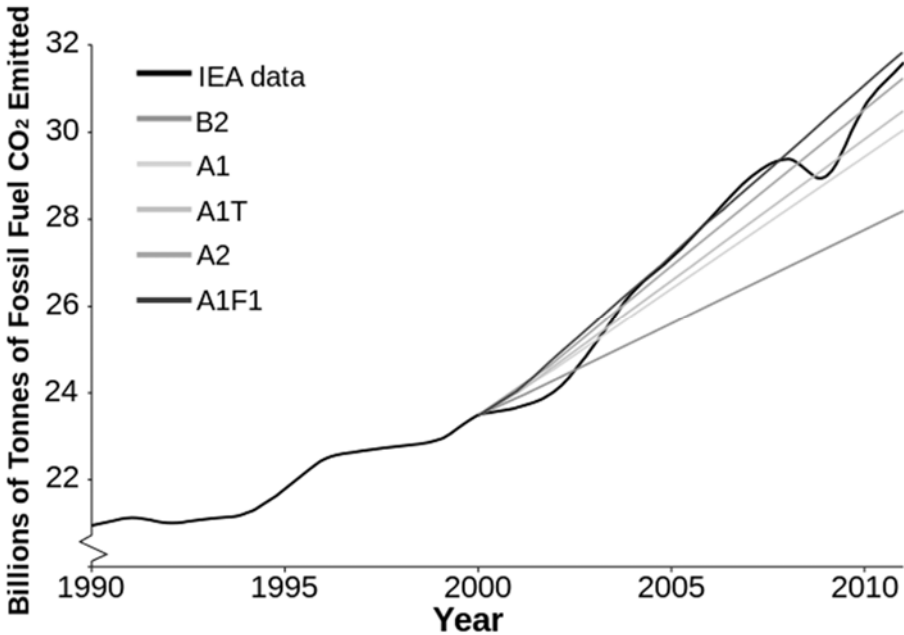
Source: UN Food and Agriculture Organization and the US Energy Information Agency

Figure 3 – Fed funds rate and Mortgage rates 2001-2008



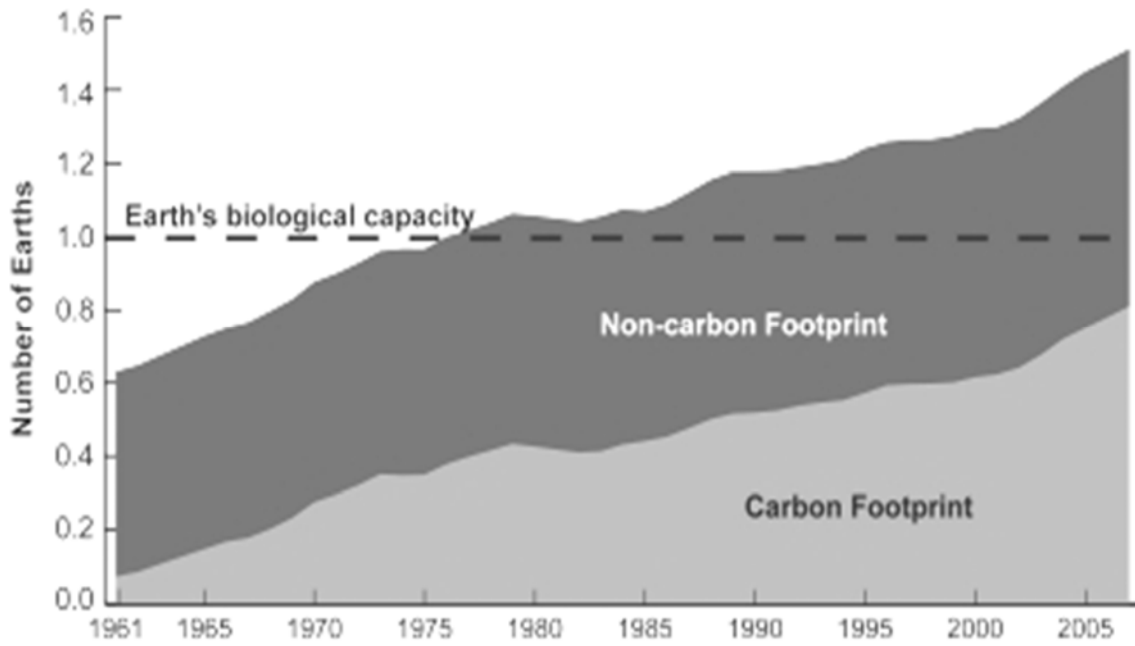
Source: US Federal Reserve, Freddie Mac.

Figure 4 – IEA CO2 emissions per year vs. IPCC scenarios



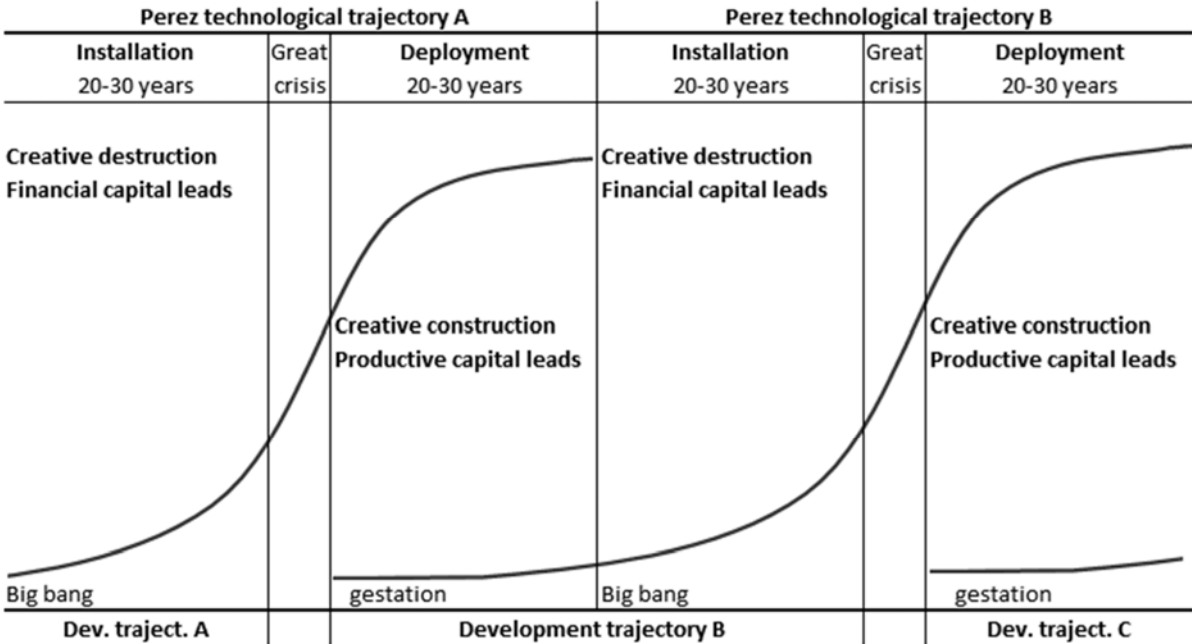
Source: IPCC emissions scenarios (IPCC, 2007).

Figure 5 – Ecological footprint and the environmental debt



Source: http://www.footprintnetwork.org/en/index.php/gfn/page/carbon_footprint/

Figure 6 – Perez technological trajectories and development trajectories



Source: Author’s elaboration on the basis of Perez (2002 and 2009).