

From Growth to Innovative Reproduction

A Roadmap for a European Model of Evolution

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Abstract

This paper starts with the methodological assumption that the description of the evolution of political economy needs two distinct components: a model of pulsating growth and a model of morphogenesis. These two elements are alternating in the course of time, deteriorating growth leading to morphogenesis, which in turn consolidates structures on a qualitatively new level from which another kind of growth then can emerge.

In a second part Europe's current economic and political state of affairs is discussed, using the previously developed methodology. In particular the major contradictions preventing a return to business as usual are highlighted and set in relation to global developments.

Part 3 then depicts a manageable set of six broad topics as a first step towards a future program for a radically different political economy of Europe.

Introduction

To proceed from method to a particular object of investigation is a good old style of research papers. I follow this style and add a third part which carries the analysis of European political economy to a proposal of how to get from here to a better future. The aspirations are thus tremendous, and a report on work in progress – like this paper – will necessarily have to frustrate readers who expect a final word on the topic. It remains to hope that they at least feel stimulated.

Chapter 1 presents a discussion of this methodological starting point and its relation to the mainstream assumption of stable equilibrium growth.

Given this methodological prelude, in chapter 2 the current impasse of European economic growth is reconsidered. In particular a highly aggregated dynamic macroeconomic model is circumscribed and used to show how and why growth in OECD countries has necessarily ceased. The symptoms of ever more severe liquidity crisis – first of banks, later of nation states – are shown to disguise a more profound shift of underlying fundamentals. These tectonic dislocations are identified as most important indicators for possible morphogenesis.

In chapter 3 some economic policy options for supporting a new European model of political economy are presented. The evolution of these options has to take into account the role which Europe can play in global evolution. Without a full-fledged model of the world economy (which is beyond the scope of this paper) this embedding of European options has to remain rather sketchy – but it reveals at least the terrain on which future struggles (in theory and practice) might take place.

1 - Methodology: Two Perspectives plus one Contradiction

Loosely interpreted, the second law of thermodynamics states that in the long-run there is a trend governing all processes called entropy, which leads to a complete loss of all kinds of structure¹. Fortunately enough, this law is a stochastic law², implying that despite its long-run validity counter-movements to this law called negentropy, the build-up of structure, is possible. This in turn implies that any such build-up of structure is temporary - transitory - since in the long-run it will be dominated by increasing entropy, i.e. the loss of structure. In other words, theories about the build-up of structure necessarily have to take into account at least two points in time: the point when the counter-movement starts, and the point

¹ See [Penrose, 2004, pp. 690-702] for a more precise treatment of entropy in theoretical physics – and an interesting interpretation of its theoretical status: ‚My own position concerning the physical status of entropy is that I do not see it as an ‘absolute’ notion in present-day physical theory, although it is certainly a very useful one. There is, however, the possibility that it might acquire a more fundamental status in the future. For this, quantum physics would certainly need to be taken into consideration ...’ [Penrose, 2004, p.692]

² Probability theory is itself a theoretical area in flux. To assert random character by means of well-determined characteristics bears a contradictory force which seems to be not fully understood yet.

when it breaks down. Instead of describing a (presumably) eternal law, such theories necessarily are models of historical episodes.

Models of all living systems are models of the maintenance and build-up of structure. They fall thus under the category of models incorporating negentropy episodes. More precisely these models will have to describe the transient existence of their respective object of investigation including its birth and its death. Even more interesting is the empirically observed fact that living systems manage to initiate self-similar copies of themselves, often adjacent to their own location. Counting the number of copies leads to the notion of measurable **growth**: the number of newly born copies minus the number of died copies divided by a unit of time, e.g. one year. Growth - understood as a scalar measuring the number of net additional micro-units per time unit - is a universal feature of a living system existing as an organized set of many micro-units for many time units between its birth and its death. The very notion of growth thus already needs a lot of structure: local copies, distinction between micro-unit and organized aggregate, distinction between shorter time unit (e.g. a year) and lifetime of the aggregate (from birth to death). In these structural preconditions of growth a lot of inherent qualitative jumps are to be found. The most important one is the jump concerning the emergence of a copy. How does it come about³? This question of metamorphosis, of prolonging the own existence by giving birth to a copy, stands at the cradle of any theory of growth – as empirically observed fact as well as from a logical point of view. As larger aggregate systems also die, this question of metamorphosis reappears in larger scales and longer time frames. The stepwise development of living systems on earth - as approached by a theory of evolution - therefore can be captured as such a multi-layered sequence of alternating processes of growth and emergence.

Phases of growth of an encompassing structure and much **shorter time spans of emergence of a new constellation** are interacting, the one invoking the respective other. While their interplay constitutes what the overall evolution of life characterizes they still remain rather distinctly different types of development processes. These ideas are not new: For Marx human history is an evolution repeatedly accelerated by revolutions, which he considers to be the (fast) trains of progress [Marx, 1850, p. 85]; for Schumpeter the swarming of basic innovations within rather short time periods provokes a new technological setting during which for a long time only smaller innovations cause a little bit of progress. To emphasize that economists of his time typically ignored innovation⁴, Schumpeter even devoted a book to the first type of deep changes in processes and products [Schumpeter, 1911].

³ From the point of view of formal description the first sophisticated attempt to understand this process was made by John von Neumann [Neumann & Burks, 1966], see also [Hanappi, 1994, pp. 43-54].

⁴ In particular Stanley Jevons had proposed to adopt the formalisms of theoretical physics: 'The nature of Wealth and Value is explained by the consideration of indefinitely small amounts of pleasure and pain, just as the Theory of Statics is made to rest upon the equality of indefinitely small amounts of energy.' [Jevons, 1871, p. viii]. In Schumpeter's view the dynamics imported from mechanics leading to market equilibrium had to be complemented by countervailing forces, forces Schumpeter labels 'innovation'. Evidently such a non-linear model will never come to rest on an equilibrium path and will repeatedly produce higher waves of economic activities, see [Schumpeter, 1939].

For the longer periods between deep breaks the body of literature commonly known as (mainstream) **theories of economic growth** has provided ample formal descriptions. Two prominent outposts of such models are the model of Robert Solow and the model of Richard Goodwin. Phelps⁵ following **Solow** argues for the existence of a ‘golden rule of accumulation’, a set of trajectories of a handful of macroeconomic aggregates which maximizes long-run household consumption. The focus is on the dynamic stability of this growth path brought about by the substitutability of labor inputs and capital. Technical progress is not endogenously explained, nor is there any discussion of exploitation⁶. **Goodwin** loosens the assumption on full employment but sticks to exogenous technical progress. He comes up with limit cycle dynamics which are dynamically unstable but structurally stable: As long as the parameters do not change the endogenous shares of national income and employment follow the same cycle but will jump to a different cycle (again a cycle, hence structural stability) as soon as the slightest change in parameters occurs (hence dynamic instability). In both types of models start and end of the growth process cannot be formulated, and - even more disturbing - the essential motor of economic growth in capitalism, namely the increase of labor productivity by profit-maximizing entrepreneurs, is completely neglected.

Of course, the renaissance of growth theory in economics starting in the 90-ties has produced several interesting extensions of these two basic streams of post-war contributions. Multi-sector models and multi-country models showed how additional constraints coming from production technologies and trade conditions can be embedded. A new branch of models called ‘**endogenous growth models**’ has evolved which includes (technical) knowledge as an additional, endogenous stock variable in Solow-type models [Roemer, 1990]. But like Solow’s original model these models still focus on existence, uniqueness and stability of an equilibrium path – now with two additional macroeconomic complications: (i) that labor time can be spent either to increase output or to increase knowledge, (ii) that the capital stock of knowledge does not obey the assumptions made for the traditional capital stock, namely decreasing returns. And since such models are usually non-linear and it is thus more difficult to derive general results, they usually just get stuck in technicalities⁷ - remaining even less convincing blueprints of people’s capitalism than the

⁵ Phelps endogenizes the savings rate which is an exogenously given ‘constant of social psychology’ in the original Solow model, see [Phelps, 1961] and [Solow, 1956]. While the message of the original model is that for given saving rate and population growth the capital-labor ratio can always adjust to provide a unique and stable equilibrium growth path, Phelps’ model adds the result that with an endogenous savings rate to maximize per head consumption along the path this maximum can only be equal to the marginal productivity of labor.

⁶ As is usual in mainstream macroeconomics the possibility of unemployment is excluded by assumption: Real wages are assumed always to have fallen infinitely fast to a level where full employment persists.

⁷⁷ The reactions of authors in this tradition on the growing distance between their models and actual developments of global political economy are interesting. Some indeed try to jump to extreme empiricism, amassing large amounts of data to show that their theoretically insufficient models nevertheless can lead to economic policy issues, e.g. [Barro & Sala-i-Martin, 1995]. Of course, the implicit assumptions of the estimated models render econometric results at best a rather trivial character.

original Solow model⁸. Another strand of attempts to incorporate technological progress has tried to invoke probability theory again: In [Aghion & Howitt, 1998, pp. 53-84] the occurrence of technological pushes is assumed to follow a Poisson process. Compared to the approach put forward by Barro & Sala-i-Martin the Schumpeterian tradition represented by Aghion & Howitt is more modest in its aspirations, rather tries to collect ideas to form new combinations. But the goal of this strand of growth theory is not so much to provide a theoretical innovation, a new model of endogenous growth; it rather consists in the attempt to provide and to extend the toolbox necessary to construct a diversity of models appropriate to deal with specific policy questions. As such this neo-Schumpeterian macroeconomics is by far more helpful than earlier contributions to 'endogenous growth'.

Despite the enormous efforts of modern economic growth theories of all sorts the perspective of growth leading to breaks and new combinations with a new growth dimension – the first methodological element proposed in this paper – somehow remained out of focus. The limits set to the perceptive capacity of economists by inherited traditional topics and modes to deal with these topics seem to be too narrow to allow an easy transition to a more synthetic view of social phenomena. This is even more evident with respect to the **second methodological element proposed**, the short period of **revolution of the political economy**.

If science is mainly driven by scientists and scientific institutions which get their finance by those who already are in socially powerful positions and are interested in the stability of this situation, then it is only straight-forward that theories about possible revolutions are restricted to contributions helping to prevent such turmoil. The only area where a more positivist treatment of sudden interruptions of the economic process was considered to be interesting enough to be supported was **innovation at the firm level**. And this was exactly the can of worms Schumpeter opened in the interwar period. As a politically very sensitive person he also immediately immunized his mild sort of entrepreneurial revolution by two adjectives: It concerned only revolution of technology, and it took place on three different time scales (Kitchin cycles, Juglar cycles, and Kondratieff cycles). Original 'creative destruction' à la Schumpeter therefore is a far cry from what currently is going on as a deep break in global political economy. What gave Schumpeterian economics the kick it received in the last decades was **the incorporation of modern evolutionary methods** imported from biology. To explain the rich variety of firms and firm organization which is empirically observed, the standard mainstream approach starting with the assumption of a representative firm was so inapt that even conservative economists were happy to work with a more promising metaphor: models of the survival of the fittest. Darwin had imported it from Malthus and now, in the disguise of biological formalisms, it returned to economics⁹. Indeed evolutionary simulation techniques proved to be a success in many areas; the genetic algorithm and methods of evolutionary game theory are broadly applied. With respect to interpretation of these processes the revitalization of Schumpeter is not the only game in

⁸ Visions underlying economic models are dealt with more extensively in [Hanappi, 2010a].

⁹ Compare [Hanappi & Hanappi-Egger, 2004] for a more sophisticated treatment of that issue.

town. Methods of the natural sciences have been developed for a long time to understand the sudden transition from a fluid to a gas, the growth of crystals, and the like. *Econophysics* has become a promising discipline, which in the future should arrive to become a social science¹⁰. In biology the first boom of the dominance of genetics is starting to give way to a more thoughtful branch of *molecular biology*, which is focusing on the more sudden emergence of higher level entities, like (the diversity of) cells. Instead of the simplistic metaphor of genes looking for carrier systems (like humans) to propagate their structure, there now a sensible theory of the emergence of bounded diversity of larger entities, e.g. molecules, seems to come into sight. A third most interesting field for the exploration of switches from slow quantitative growth to sudden morphogenesis might be the area of *(formal) network theory* itself: ‘One of the most striking results of random graph theory is that most monotone properties appear suddenly. That is there exists a *threshold* function $M^*(n)$ that determines whether or not a graph is either very unlikely or very likely to have the property Q. ... The important thing to understand is that if we imagine random graphs as dynamic “organisms”, growing in time, then the appearance of practically any property of interest will occur on a timescale that is very short compared with the timescale of the whole process.’ [Watts, 1999, p. 37].

The current state of affairs of formal treatments of short-run emergence in different fields does not allow for an overarching model – yet. To simulate the exploration of possible combinations of old (theory) elements is a general and rather vague recipe. Exploration refers to an evaluation process, but how this is to be organized has to remain in the dark – in the end the result has to be novelty, which in turn necessarily casts a shadow on any pre-determining evaluation procedure. The link of the revolutionary intermezzo to the just passed growth phase clearly consists in the use of old elements, which are to be combined in a new way. Memory, more precisely the creative use of historical interpretation plays a substantial role¹¹. How old elements have to be brought into relation to each other is motivated by another link to the past: It is the set of contradictions which have lead to the collapse of the last growth regime, the acute problems of survival, which force *and organize* the arrangement of new combinations¹². Solving current contradictions by trials of new combinations also needs a kind of common vision of those groups in society who are the

¹⁰ It has not arrived yet. Still most contributions of natural science are characterized by a rather naïve approach to the already existing body of knowledge in political economy. The need for transdisciplinarity means that a scientist must really be at home in both fields to appreciate the existing bodies of knowledge; a task which only few contemporary researchers might achieve.

¹¹ This characterization includes all kinds of revolutions: ‘Men make their own history, but they do not make it as they please; they do not make it under self-selected circumstances, but under circumstances existing already, given and transmitted from the past. The tradition of all dead generations weighs like a nightmare on the brains of the living. And just as they seem to be occupied with revolutionizing themselves and things, creating something that did not exist before, precisely in such epochs of revolutionary crisis they anxiously conjure up the spirits of the past to their service, borrowing from them names, battle slogans, and costumes in order to present this new scene in world history in time-honored disguise and borrowed language. ... In like manner, the beginner who has learned a new language always translates it back into his mother tongue, but he assimilates the spirit of the new language and expresses himself freely in it only when he moves in it without recalling the old and when he forgets his native tongue.’ [Marx, 1852].

¹² How to proceed along these lines is shown in [Hanappi, 2010b].

material carriers of revolution. This vision constitutes the link forward into the next growth phase along a new dimension, it not only frames the essential epiphenomena of this next era, institutions and law system, it also is important during the revolutionary reshuffling and inevitable coalition policy. To rebuild a ship at sea urgently needs orientation and leadership – which itself constitutes a deep contradiction, since a strong lead towards novelty undermines the very character of novelty. The sharpened inconsistency between strong policies needed and little certainty currently available about their implications is characteristic for times of emergence of a new political economy¹³. With respect to the scientific community this contradiction points at the enormous challenge it is confronted with.

What is needed thus are at minimum two models, one describing the era of (more or less quiet) growth, the other one mimicking revolutionary break of political economy. These two models should be linked by descriptions of contradictions leading from growth to break, and descriptions of institutionalizing processes leading from revolutionary times to the next settled era. Settings of one era then produce memories used in several following revolutionary episodes. The defining characteristic of the human species, as opposed to all previous living systems, consists in the use of internal models of individuals. Communication structures and strategic behavior play an essential role in the formation of social strata. It is only with the help of game theory and agent-based computer simulation that we start to be able to grasp the essence of everyday social interaction. In a sense, the new toolsets knocking at the doors of social scientists open up a new era of understanding, many of the results of the highly specialized toolbox of mathematical economics developed in the last 50 years will still be acknowledged as correct. But they will be shown to be special cases with no empirical relevance beyond ideological warfare.

The methodological needs for models of human social evolution are clearly substantially more demanding than those for models in the natural sciences. As this brief review shows we are just beginning to realize how big the challenge is.

2 – Europe at the Crossroads

What is considered to be the most severe global economic crisis since the Great Depression of the 30-ties has hit OECD countries hard. Taking Europe as point of reference it is evident that the post-war era of growth has fallen to an accumulation speed, which is so low that indeed the basic working mechanisms of the political regimes regulating this accumulation are called into question.

¹³ It is tempting to associate this type of basic, necessary uncertainty – as opposed to uncertainty related to just not knowing what others might know – with the respective concept in physics, and with Keynes' notion in his treatise on money [Keynes, 1921].

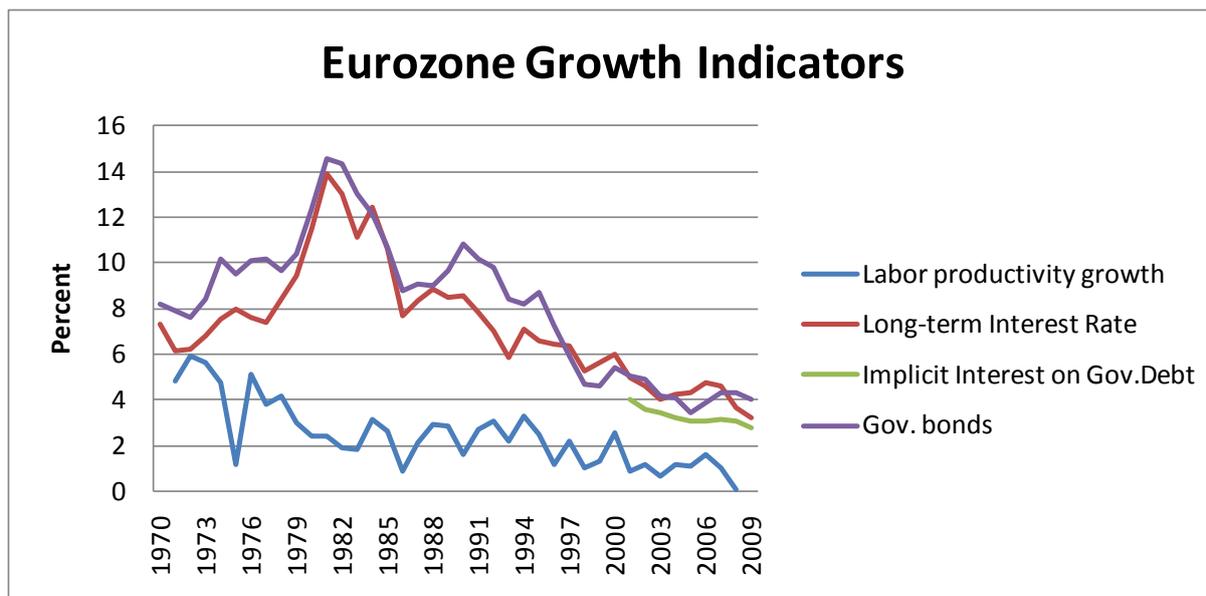


Diagram 1: Eurozone Growth Indicators

Source: Eurostat, <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>

Diagram 1 shows some central recent developments of the Eurozone countries. The choices of Eurozone countries as well as the use of the period from 1970 till the present need some comment. The Eurozone was taken since it is the group which can be considered to be in the vanguard of a continental political unit of Europe; its goal is to unite all of Europe under a consistent monetary and fiscal regime, i.e. a common political economy. Moreover this group of countries in 2009 represented 66% of EU 27 population and an impressive share of 76% of EU 27 total GDP. It thus seems to be legitimate to use the Eurozone as point of reference for Europe's future development. With respect to the time frame it is clear that in the early seventies a severe change of global economic development has occurred: With the breakdown of the global system of fixed exchange rates (Bretton Woods) in 1971, the subsequent oil price shock of 1973, which forced the different large countries into synchronous business cycles, and the worldwide conservative roll-back of economic policy starting with Thatcher (1978), Reagan (1980), and Kohl (1982), with all these changes it seems to be reasonable to consider the early seventies as the start of a new global accumulation regime. Even though the breakdown of the Soviet Union and its satellites in the early nineties provided a further shock to this regime, the data in diagram 1 reveals that this was not too disturbing. On the other hand a period of almost 40 years seems to be long enough to detect some features of the reasons why it came to an end, even with annual data only.

The starting point of any model has to be a theoretical idea¹⁴. In this case this idea is that the historical mission of capitalism consists in the increase of labor productivity by using motives

¹⁴ In a strict sense there is no data driven modeling. Consulting of data should inspire model-building and correct it if it goes astray, but even the choice of which data to look at is already part of a theory; not to speak of the hard assumptions on functional forms which exaggerated data orientation usually involves.

of profit-maximization of private firms¹⁵. Competition thus will force firm owners to become entrepreneurs and therefore - without the intention of entrepreneurs and often even without their knowledge – the overall amount of labor time required to produce a certain consumption bundle will decrease, global human welfare will increase. Since any historical mission has a start and an end - compare the previous chapter on methodology – it is evidently a growth phase, perhaps with first signs for a transition to a revolutionary break, which is shown in diagram 1.

As the diagram shows, in Europe the capitalist mechanism in the period of consideration was only able to produce decreasing growth of labor productivity (blue line). In 2008 this growth even came to a halt. The long-run stagnation of labor productivity growth is the surest sign of the end of this epoch. For European firms it implies that exploitation techniques using innovation are not available any more – at least within Europe. In the face of this dramatic decline it is rather surprising that long-run interest rates (red line) are decreasing, but still are permanently higher than labor productivity growth. How could interest rates be higher? One immediate answer to that question is that interest rates are driven by expectations of finance managers, who in turn are not only looking at productivity growth, but also at political developments¹⁶, and the like. A second answer is that a new form of exploitation, named ‘exchange rate exploitation’ in this paper¹⁷, has supplemented traditional exploitation. European exploitation based solely on European labor productivity increases would have collapsed much earlier. Interest rates promised to capital owners therefore could be deducted not only from expected successful innovative activity of firms, but also from expected growth due to what became to be known as **globalization**: global division of firm actions exploiting preferable wages, tax systems, effective demand, and currency devaluation. As diagram 1 shows the contribution of globalization to keep the system running was substantial, leading to an overshooting of interest over local (continental European) levels of some 3 percentage points in the last decade. Note that the global division of continental functions did not render Europe as secondary global power, quite the opposite is true. Europe became a prime location for effective demand.

With the suspense of collapse enabled by globalization some background reasons why the collapse occurred at last become visible: It has been finance capital, i.e. the trading of profit rate expectations in form of recursive contracts¹⁸, which acted as the driving force behind exchange rate exploitation. The wave of capital directed to finance capital managing exchange rate exploitation did swell proportionally to the swindling of profit rate

¹⁵ As Hegel noticed a long time ago such an assumption calls for a subject guiding the progress of the human species. He wisely proposed this subject to be reason (‘Vernunft’), and called this assumption a trick of reason (‘List der Vernunft’).

¹⁶ The sudden increase of interest rates in the early eighties is a good example. Of course, Ronald Reagan was not only fueling expectations, but also initiated high credit demand for his Star Defense Initiative (SDI) which in turn boosted global interest rates. But actions like that were already expected to happen by actors on stock exchanges – as any investigation of the relation between elections and interest rates reveals.

¹⁷ Though several important elements are involved this name was chosen to highlight the fact that exchange rates took the dominant place originally occupied by price-wage relationships.

¹⁸ Compare [Hanappi & Rengs, 2008] for a more detailed treatment.

expectations in other areas of exploitation. Moreover, public funds in OECD countries, e.g. pension funds, had to join the run to stock exchanges to keep income expectations of their clients on track. It must not be forgotten that purchasing power of households assigned by banks depends on discounted lifetime income - for Europe the vital global function of a consumer continent was at stake. Fragile credit constructions were even more significant in the USA, and they were handled by a much less integrated banking system than Europe has at its disposal. This was the stuff that financial bubbles are made from, and a reason why it finally started to crash with the US housing market. More important than the trigger of the crash is the general contradiction which is hidden behind the events: Expectations of possible profit rates from time to time have to prove that they are justified. Even if you trade the possibility to eat the pudding in form of recursive contracts promising ever larger puddings, at some point in time a competitor will force you to travel down the long route of promises – the prove of the pudding will be the eating. If it turns out that there is nothing to eat, then a chain reaction destroying not only the immediately concerned expectations but also all neighboring ones cannot be avoided. So far all this can be considered as the usual procedure of weeding out failed entrepreneurship, an evolutionary process immanent in the long growth phase of the post-war world economy. Perhaps new regulatory frameworks like BASEL 3 could help to keep expectation pyramids small and bubbles manageable. A deep contradiction only becomes visible if one turns to political units (public funds, states, etc.) as agents in this process. In the original blueprints of integrated capitalism¹⁹ these agents were not supposed to act like profit-maximizing and accumulating actors, condemned to what vulgar economics of our times calls 'growth'. This **first contradiction** was building up during this last growth phase, first in banks (which in their network with central banks also are political institutions) then in nation states: It has become increasingly impossible to guarantee continuously increasing purchasing power of households and at the same time be confronted with risks which by their very nature sometimes strike. **Political units are not private firms**. It is not possible to tell a whole generation of employees that their pensions have unfortunately been lost; it is not possible to tell Greece that it unfortunately failed like Lehman Brothers and thus will have to be erased from the European landscape. In diagram 1 the long-term yields on government bonds (10 years, purple line) as well as the actual interest rate paid for government debt (green line) are inserted. Trust in the exploitative force of political institutions seems to follow long-term interest rates rather closely, with a small extra blip from 1988 to 1991 when the successful conquest of Eastern European countries seemed to be particularly promising. Actually paid interest on government debt in the last years has been a little bit lower but follows a similar trend.

As a consequence of this first contradiction the role of the state, of political institutions in general will have to be newly defined. To provide infrastructure for the successful reproduction of society is probably one of the most general descriptions. A measure of the

¹⁹ Notably the economists proposing the 'neoclassical synthesis' after WW 2 never had an explicit economic role for political institutions, their theories were institution-free. In their view institutions were another kind of animal, which simply had to guarantee the absence of coercive forces, allowing only market interactions.

failure to do so can be the unemployment rate. Unemployment not only measures how successful employment policy measures are and how good infrastructure supports production units to extend employment. It also extends to education policy and the provision of communication and information infrastructure – all areas where private firms fail to become active.

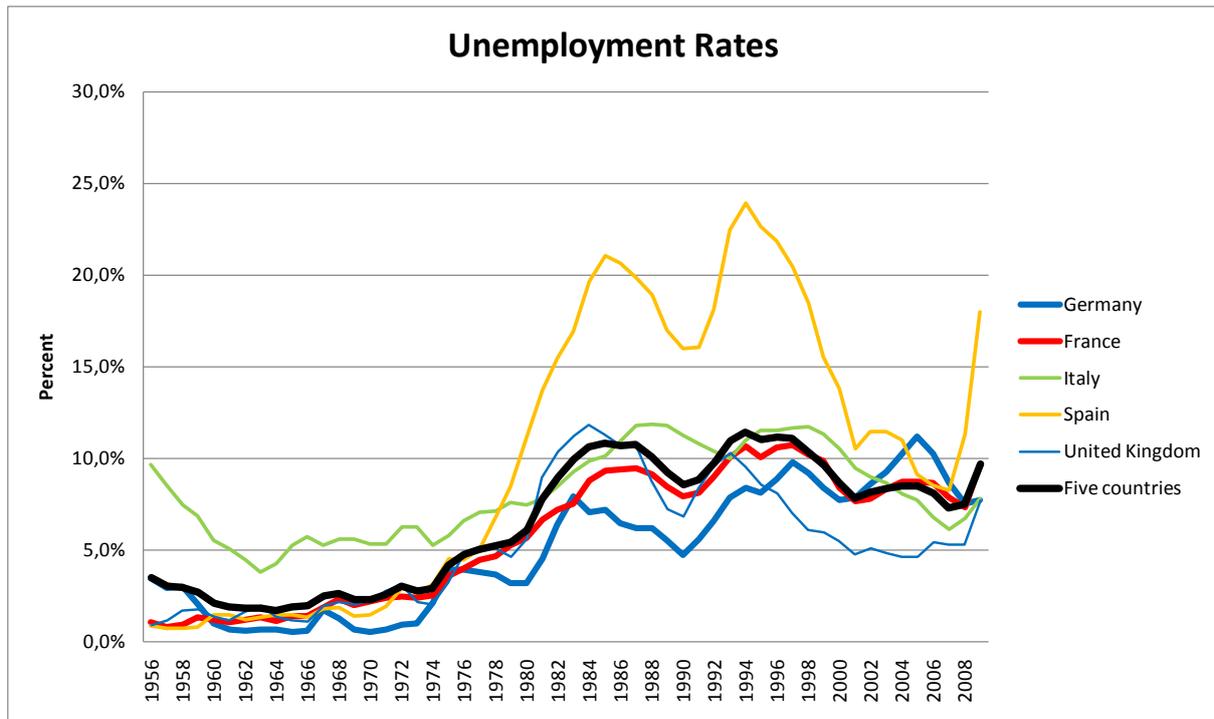


Diagram 2: Unemployment Rates

Source: OECD, <http://stats.oecd.org/>

Diagram 2 shows the massive break caused by the conservative policy roll-back in the mid seventies. From then onwards business cycles synchronized and unemployment remained high, i.e. provision of infrastructure remained poor. What also becomes clear is that the global crisis has not arrived on European labor markets in yet (the diagram ends in 2009). In other words the real dimension of the just mentioned contradiction will only start to unfold in the next few years. Nevertheless this is a short time to prepare scientific support for a profound change in political economy.

It has to be mentioned that with this turn from private firms' growth imperative to innovative reproduction lead by political institutions in Europe three major other fields of economics are immediately involved. (1) Labor organization – the length of daily labor time as well as the distribution of education, work, and retirement over lifetime – will experience a complete reform. With that income and wealth distribution clearly will have to be reformed too. (2) European production structures, which already have fallen into two large groups – transnational corporation (TNCs) and small and medium sized enterprise (SMEs) – will have to be accommodated and counterbalanced by appropriate political institutions. (3)

The increased importance of political institutions calls for a parallel increase of democratic control and anti-bureaucratic measures to avoid unintended moves to dictatorship. As can easily be seen such a revolutionary shift cannot be modeled by a growth model – but need models and simulations of emergence, the second kind of models mentioned in part 1.

A **second set of contradictions** is brought about by the mechanism, which helped to delay an earlier collapse of integrated capitalism, by exchange rate exploitation. Export of capitalist production to Asia and Latin America sooner or later had to change the systems of political economy there. While Latin America after its stepwise and slow emancipation from US imperialist influences seems to enter a stage of industrial capitalism – with all shades of labor movements emerging in the different countries – China builds on a strange mixture of the strong and centralized structures inherited from its Stalinist past, and the special relationship of economic interdependence with leading capitalist forces. In both areas – though due to different reasons - a kind of stalemate has blocked exchange rate exploitation. As a consequence capital usually circulating in this mechanism moved to the highly speculative promises of stock exchanges fueling the hype of trend traders. This contradiction shows large amounts of US Dollars in search for promising investment, which in the end find their way to charlatans whose actions finally reduce the value of the invested money to zero. This not only hurts the investor, but also the USA and its currency, the US Dollar, since it traditionally has been overwhelming US military dominance, which organized and maintained exchange rate exploitation acting as a kind of lender (of military power) of last resort. With the blocking of the mechanism military supremacy looks idle. Worldwide, but in particular in the near East and in Africa large amounts of the abundant funds have been transformed into **rising military expenditure**, which now is an exploding business. The only type of consumption for these products is war, the circuit of this growth process thus involves its opposite, **large scale destruction – another contradiction**.

As the US Dollar comes under pressure, the Euro with an imminent threat of a profound change in Europe's political economy pending will lose even more trust - no return to higher profit rates by enforced exploitation. With every success of a more progressive European model **the Euro can be expected to fall vis-à-vis the US Dollar**. Of course, this helps European TNCs to sell on world markets – and creates room to manoeuvre for European political authorities in their bargain with their TNCs. The danger is that money without sufficiently high expected profit rates in civilian projects might flow to 'political entrepreneurs' of the extreme right. The described interplay on foreign exchange markets, which in principle could be favorable for the perspective of a progressive European model, bears the danger of seducing the owners of large funds of the appreciated US Dollar to bet on a revival of military dictatorship – in particular if they observe that they lose against the Euro, which is penetrating world markets. The economic process thus undermines its own feasibility – a **further contradiction**. As diagram 3 reveals, after the break that initiated the conservative roll-back there is a bandwidth between 70 cent and 1,20 Euro which is used to mirror political strength, e.g. the 'Reagan Revolution' or the Iraq war. With respect to the crossroads at which Europe's evolution has arrived, these two possible ways in the future

could easily be traced by a look of an extended diagram 3. With the more progressive model the bandwidth will be left with an upward winding exchange rate, with right wing nationalist (sometimes military) regimes in a dissolving European Union the graph after a few years of downward trend will stop.

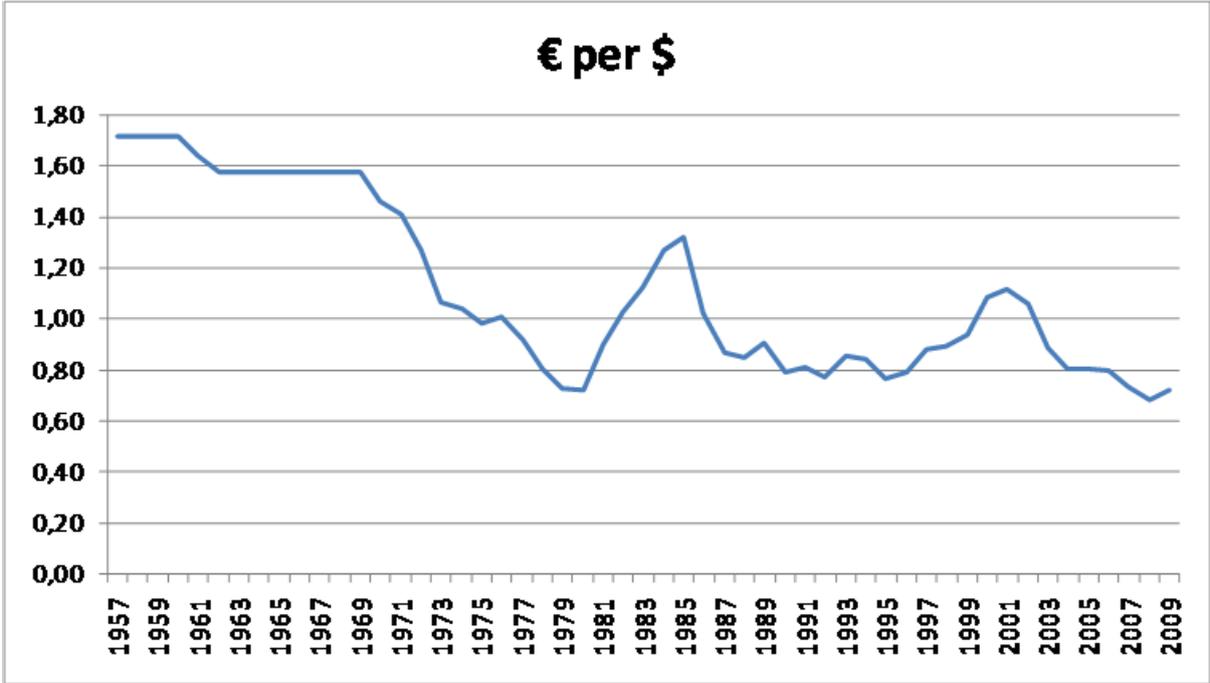


Diagram 3: Euro-Dollar Exchange Rate

Source: OECD, <http://stats.oecd.org/>

To model the possible trajectories of international relations and their implications for coalition design again is a case for emerging structure modeling of phase-2-type. This leads to the last serious contradiction to be discussed in this part: Environmental problems.

A considerable part of the success of the exchange rate exploitation mechanism rests on its ability to exploit national law systems. With no strong global political institution present and active to reconcile national legislations not only the labor laws most fitting to a TNCs goals can be chosen from a menu of candidate countries, the same is true for laws concerning the environment. The misuse of this state of affairs already has lead to several dramatic and irreversible environmental dynamics. To solve this doomsday dynamics a global political authority is urgently needed, the question is how it can be implemented. A progressive Europe on its track towards innovative reproduction will need to be quick in forming coalitions with like-minded political authorities in Latin America, Asia and the USA to prevent the worst. Accumulation of capital on the one hand, and reproduction oriented innovation serving only– democratically legitimized - utility growth on the other hand evidently are a sharp contradiction. A ‘green’ revival of a capitalism, which relinquishes growth, is not to be expected. And any new mode of production, which certainly will inherit several other features of capitalism but will miss the profit growth imperative, should be properly named.

The two macroeconomic models that could accompany the verbal descriptions just made are still work in progress. The choice of relevant variables should be rather evident – given the remarks made above. Quantitative results for growth phases and proposed game-theoretic simulations for revolutionary episodes have to wait to be presented in a future paper.

3 – A Hexagon supersedes the Pentagon

During the last decades a common view expressed by mainstream economists was that the USA in most economic respects are more advanced than Europe. Consultants to European governments and to EU institutions usually proposed to follow the examples of US policies, to imitate their ‘free market’ mechanisms. Many willing politicians were convinced and promoted the idea of a USB, a European copy of the USA. The global crisis now starts to turn the table around.

Europe’s policy options might be more promising than those of the USA – if the right decisions are taken at the right time. As a first step the evolving problem areas, the contradictions that have built up in the last decades, have to be identified. They can be arranged in the form of a hexagon (diagram 4).

All corners are connected by arguments. The three upper right corners concern problems that mainly could be solved within Europe; the lower left-hand corners address global problems. Of course, all diagonals between any two corners provide interesting debates too²⁰.

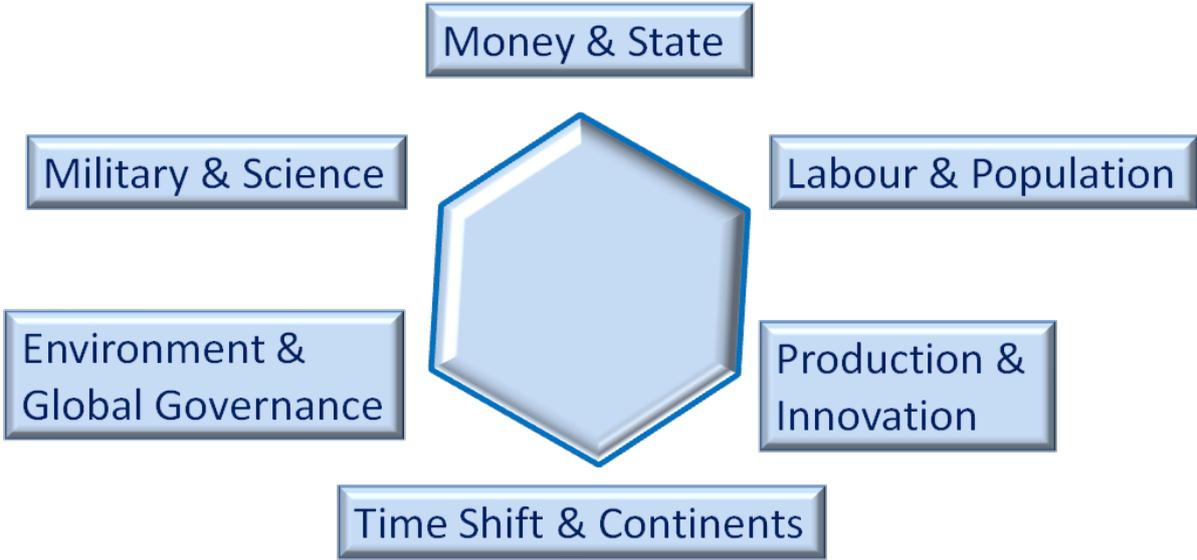


Diagram 4: The Hexagon of Europe’s Political Economy.

²⁰ A detailed discussion of these refinements is provided in [Hanappi, 2010b].

Every corner relates to a specific problem, which appears in the current global crisis. The following table also provides proposed solutions to the respective problem.

Cornerstone	Problem	Solution
Money & State	Liquidity	From profit-oriented accumulation to innovative reproduction
Labor & Population	Unemployment	From private rigid labor time extraction to flexible public labor time organization
Production & Innovation	Bankruptcy	From ideology to design
Time Shift & Continents	Exploitation	From exploitation of the unequal to the benefits of diversity
Environment & Global Governance	Pollution	From general evolution to the human species
Military & Science	War & Crime	From coercion to democracy

Table 1: Problems and Solutions

The proposed policies summarized in a few words clearly need further elaboration and currently are just milestones on the way to a formulation of a consistent political program. A brief explanation of each cornerstone nevertheless is indispensable.

The essential question hiding behind the *liquidity* problem of banks and states, which just is the form of appearance of the current crisis, concerns the way in which social value can be framed on a global scale, it aims at an understanding of the *essence of money*, and how it is transformed into its forms of appearance on carrier media. Two related issues are immediately become visible: (1) In all of its forms appearances of social value, i.e. money forms, need a political institution governing its use, they need a *state*. Global money, credit, and capital will need global governance, i.e. a *global political institution*, just like the most famous silver coin, the owl of ancient Greece, needed the state power of Athens. How to implement such a - democratically legitimized - global political institution is a practical and thus also theoretical challenge. (2) Though the groundbreaking innovations in information and communication technologies, the *ICT revolution*, showed remarkably little impact on capital accumulation as expressed in GDP growth, the future symbol systems representing social value now in principle can have a technology, a carrier system, which enables designs, which were completely out of reach just three decades ago²¹. Combining these two issues – which is mandatory – should enable the science of political economy to produce feasible blueprints of money and state.

²¹ For a more detailed treatment of the ‘future of money’, including the technological perspectives, compare [Hanappi, 1999].

It has been a rather conventional idea in the times of classical economists from Adam Smith to Karl Marx that social value, e.g. appearing as money, should somehow be linked to the time spent by the humans producing this social value. Instead of linking the value of a certain commodity to the vagaries of the needs of single individual at a certain point in time²², its value as *social* value seems to be bound much more general and persistently to the conditions enabling its production – and the time used up in the different phases of the production process seems to be a straight forward link to the interdependent network of human activities. The mediating sphere between time expended in productive activities and the sign system with which the social value of products and services is expressed is the institutional setup of society. With institutions like capitalist firms being the dominant form of production units a set of very specific mechanisms is implemented. One of the mechanisms works as a link from liquidity problems to **unemployment**, from one cornerstone to the next: Firms maximizing profits, i.e. maximizing the difference between revenues and cost, faced with sudden credit restrictions and thus inability to cover cost will reduce employment as fast as possible. The problem of unemployment therefore visibly is a consequence of a certain mediating form of institutional setting, of the fact that production units currently happen to be capitalist firms. To provide the possibility for much less and more flexible working hours per day is indeed a policy issue which European policy makers will have to face very quickly. They only will be able to deal with it when they dramatically restrict independent employment decisions of private firms²³. Similar to the previous cornerstone, considering the size of unemployment again several other policy aspects of labor organization can be derived. (1) The **growth of population** in working age - be it due to high **fertility rates**, increasing **immigration**, or earlier **retirement age** – will necessarily increase unemployment rates in any regime where total employment is fixed by capitalist firms. It is thus the regulation regime, in particular the interplay between production units and the political institution within which they are embedded, which is the central place where the upcoming catastrophe on European labor markets²⁴ have to be solved. (2) But the average age at entry and exit to and from the labor market are not only influencing labor supply at labor markets, they also determine the average shares of pre-work and after-work years in total lifetime. The debates on pension systems and on higher education systems therefore are just appendices to this broader agenda on continuous redesign of the social contract between generations. With rising life expectancy and rising needs to spend more

²² This assumption on taking an (abstract) subjective human individual's utility as the starting point for a theory of the social value of commodities has been the most important line of attack of the marginalist counter-revolution ([Jevons,], [Walras,], [Menger,], see also [Meek,]) against classical political economy. It at once enabled the elimination of 'political', thus proposing purely economic mechanisms, and at the same time implanted these mechanisms in abstract social atoms, thus destroying the possibility to distinguish different social strata and classes. It is therefore an inborn property of the mainstream of economics, which followed the marginalist counter-revolution to remain as abstract as possible.

²³ This sounds more radical than it actually is – at least as compared to actual European practice. Politically sustainable unemployment rates (typically between 5% and 20%) are already to a considerable extent subject to political control.

²⁴ The next heavy increase in European unemployment rates can be expected in winter 2011.

time on education²⁵ these ratios changed considerably, in particular in Europe. With education times as well as retirement times being organized as pay-as-you-go systems any change of the ratios of these life periods to total life time implies **a change of the institutionalized social contract between the different age groups**. Longitudinal considerations of this evolution make long-run expectations necessary, therefore are highly vulnerable to critique and indeed often are misused for biased arguments of contemporary pressure groups. But what a thorough cross-section analysis of contemporary societies nevertheless reveals is the immediate need to reframe the current institutional setup. For Europe it seems advisable to increase education time implying a later entry into the active work period, and also to delay the exit from active the active work life just as much as life expectancy grows (leaving the time spent in retirement untouched)²⁶.

The next cornerstone, **production and innovation**, is taking the mediating historical structure discovered in the previous cornerstone, i.e. capitalist firms, to a test: Is economic theory describing production units adequately? And if not, how would theory have to be adjusted to advice welfare enhancing global economic policy? Even the shortest glance at mainstream microeconomic textbooks and their insistence on the 'representative firm' shows that the first question must be negated²⁷. With respect to the second question the evident **divide between transnational corporations (TNCs) and small and medium sized enterprises (SMEs)** clearly has to be addressed as an essential element of an adequate theory. While the former act on a global scale with political and economic power, which often surpasses the power of nation states, the latter are much more subject to political actions (restrictions as well as subsidies) and at least in Europe provide the majority of employment opportunities. The SMEs thus are to be seen already rather as a part of their political environment, dominantly the respective nation state but increasingly also the European Union. They tend to turn into 'political animals'. Several experiences of surprising coalitions in Europe's recent past can only be explained if the distinction between TNCs and SMEs is taken serious, e. g. the one between the social-democratic founders of the EU and European TNCs, or the one between SMEs and certain Europe-skeptic movements²⁸. At this point the 'historical mission' of capitalist firms, as it was seen by classical political economists, has to be remembered: To increase labor productivity (in principle a welfare enhancing process) by profit maximizing, exploitative activities (in principle a welfare reducing process). In the period of the industrial revolution British entrepreneurs indeed were forced by the limited resources available on the island to create new production

²⁵ This is a direct link to global division of labor: Europe's future place in the global division of labor can only be positioned as a place of extraordinary highly qualified labor force. And not – as currently is the case - just as a pool of high effective demand. Division of labor in the first place has to refer to global production, and not just to the blind needs of profit maximizing TNCs, which easily lead to financial crisis in the global political economy.

²⁶ For a detailed treatment of these ideas see [Hanappi & Hanappi-Egger, 2006].

²⁷ This is the reason why more empirically inclined economists have successfully developed the scientific field of 'industrial organization', a misnomer but from the point of view of content a true advance (e.g. [Cimoli, Dosi, and Stiglitz, 2009]).

²⁸ How important a clear view on production structures is, has been shown already by Alfred Sohn-Rethel with respect to the rise of Fascism in the interwar period [Sohn-Rethel, 1936]

methods to sustain profit rates at expected levels. Under these circumstances competitive market forces did play a certain role, in particular if they were compared to the feudal regimes prevalent on the continent²⁹. This idea of countervailing forces as motor of progress - private vices driving public benefits – has been around in a more general form since Bernard Mandeville’s book [Mandeville, 1714]. As any other historical epoch industrial capitalism had a beginning and an end. Most economic historians consider the twentieth century as a new era, within which the basic idea of industrial capitalism was forced to be modified to include the aspirations of the labor class. A different kind of capitalism had emerged³⁰. In the last decades since the early eighties the capacity to integrate - extensively larger parts of the world, and intensively larger parts of each individuals experience - has been driven to its limits. The emergence of TNCs as a species of dinosaurs’ vis-à-vis herds of SMEs with little or no entrepreneurial spirits – in particular in Europe, see diagram 1 – shows³¹ that time for a change has come. **Innovation**, the core function of capitalist firms, which justifies their historical existence and reconciles it with all the pains the accompanying exploitation has brought about, **has to be detached from the image of the ‘representative capitalist firm’**. Profit maximizing innovations carried out by TNCs at a global level are increasingly becoming welfare reducing - war industries, pollution, and finance services with disastrous wealth distribution consequences are the major components – while European SMEs are so tightly bound to politics to survive at all that independent entrepreneurial activity has degenerated to successful lobbying for public support in fashionable areas. Seen from the opposite perspective these SMEs could be the basis for Europe’s future type of **reproductive innovation**: a new type of production unit **servicing directly** - under democratically legitimized conditions - **to increase the utility** of the consumer. For TNCs again the necessity of a global political counterpart institution has to be emphasized, in particular to channel their contributions towards the needs of Third World countries³².

The last sentence leads directly to the next cornerstone, **time shift and continents**. It is obvious that large parts of the world are in a stage of development, which is radically different to the one experienced by Europe’s citizens³³. A change of continent means a journey to a different time. The sequence of stages that a continent experiences are not the same for each continent, nevertheless there are some similarities: Latin America seems to undergo a kind of development mirroring some aspects of Europe’s early industrialization, including the emergence of different shades of labor movement organizations; China experiences industrialization too, but under the institutionalized framework of a modernized

²⁹ See [Hobsbawm, 1962].

³⁰ Paul Mattick called it ‘state-capitalism’ [Mattick, 1969], German post-war social-democrats called it ‘soziale Marktwirtschaft’ [Helmstädter, 1989], the author called it ‘integrated capitalism’ [Hanappi, 1989].

³¹ While profit maximization will play a minor role (even today most SMEs are already happy to survive), price mechanisms as indicators of demand will persist. Note that this is the proposal of a pilot project just for Europe’s production units.

³² The extreme global oligopolisation of TNCs during the last decades (compare [Nolan et al, 2007]) has led to even larger neglect of the needs of Third World households.

³³ A modern classic of this view was written by André Gunder Frank [Frank, 1978].

Stalinist production system³⁴; Africa by and large has not entered industrialization yet, but still seems to be in the doldrums of coercive nation building. In each of these cases integrated global capitalism, its leading governments and its TNCs, have intervened to use the existing unequal conditions for their purposes, for global exchange rate exploitation. The deeper issue behind these processes is that there is a quite general feature of capitalism, which has not been described in the writings of classical economists, simply because it occurred only when industrial capitalism's globalization set in, i.e. in late 19th century: the systematic use of large scale time shifts. Classical economists usually took a nation country as their basic economic unit and argued that market forces, though starting at different points in different countries, via trade will lead to a reduction of these differences³⁵. What happened in integrated, global capitalism after WW2 proved this assumption to be wrong, wrong on micro-, meso-, and macro-levels. **Whenever integrated capitalism encounters a historically grown exploitative relationship** it does not level out differences and does not equalize all participants in a market process to become anonymous resource owners and traders of equal status confronted with the market mechanism. Quite the opposite can be observed: A capitalist agent **jumps on every pre-existing exploitative relationship and deepens it**. The distance between poorest and richest countries is growing as exploiting coercive leaders in poor countries are supported, are integrated; the differences between large capitalist firms and pre-capitalist production units are growing as large scale finance and advertising, as well as distribution devices are not accessible to them; even the differences between wages per gender on the average are not decreasing as long as ideological forces can be exerted strong enough to keep the extra exploitation going. **Progress towards equal treatment of market mechanism participants** thus cannot be expected to be furthered automatically; it could (and still can) only come about as **the result of a conscious effort of the disadvantaged** – eventually supported by groups of scientists working in political economy. Another consequence of the flexibility of integrated capitalism to jump on any pre-capitalist form of exploitation is the emergence of a broad spectrum of different, sometimes overlapping disadvantaged groups. This specific form of variety, the variety of the groups of losers in market processes gives the **concept of variety** in general a **pejorative nimbus**. Success in the market does connote with conformity, with stream-lined features reminding on the representative firm of the corresponding ideology. With respect to **Europe** its **cultural diversity** appears as an impediment, a burden, which every European country should try to get rid of. On a global scale the same imperative holds. But as in a pilot project of a better political economy of Europe diversity **will turn out rather to be an advantage** than a deficiency, this will also be the case for global diversity. Non-conform needs can be satisfied by politically determined diverse finance, innovation, and investment decisions, which are not pressed into the straitjacket of a maximum expected profit rate.

³⁴ For the definition of a Stalinist production system compare [Hanappi, 1994, pp.112-161].

³⁵ Even Karl Marx in his treatise , On the Question of Free Trade'did subscribe to this view [Marx, 1848].

And satisfying this diversity of needs will make the new regime climb up the scale of overall welfare³⁶ much better than the current one ever could.

As investment needs of third world countries could only receive appropriate attention by the force, which a global political institution will have to exert on TNCs, so will successful **environmental policy** only be possible when it is carried out by a powerful global institution. Since the dangers brought about by the behavior of capitalist agents have already reached a level, which soon might call into question the very existence of the human race, this **cornerstone** of the hexagon constitutes a burning problem to be **solved urgently**. Like the previous cornerstone it can only be addressed on a global level if long-lasting results shall be achieved. At local and even at continental level neither CO₂ emissions nor water and energy resource problems can be reasonably debated, not to speak of being decided. It is in this area that the **necessity of global governance** is immediately clear. But there again a deeper scientific question is hidden behind the veil of the immediate action needed so urgently. From the point of view of biology the evolution of the human species is just the latest episode in a long sequence of species coming and going. There seems to have been something like progress advancing from plants to the animal kingdom, and then with another jump to the human species. Not all species survived and still co-exist with us, a similar fate might be waiting for mankind just around the corner. Contrary to all its forerunners humans have the capacity to develop and to use internal mental models, which even include images of themselves – they are self-conscious. With this capacity they can steer their own evolution to an extent incomparable to all previous life forms. But with this power also comes an extraordinary challenge: We have to develop a feasible vision of our long-run evolution, which is compatible with all other living systems – as far as we want them to survive (e.g. certain mosquitoes) - and all available resources. We thus are in need of some kind of master plan: **How to embed human evolution in overall evolution**. At first sight this seems to be a mundane task, at least if compared to all the other burning issues mentioned. But given the enormous influence, which visions can exert on societies, in particular in times of crisis, it is necessary to keep an eye on the development of such a **positive vision**³⁷. International think-tanks composed of scientists coming from all concerned research areas will be needed to synthesize the already existing knowledge, and to determine the directions in which future scientific effort should flow.

The production of informed visions thus pre-supposes knowledge; it is evidently built upon scientific activity. The **last cornerstone** to be discussed thus is reached, **military and science**. Why military? The answer consists in the view that the political evolution of mankind as a special species of mammals rests on the already mentioned ability to build and use internal mental models. As a spoken and later on written language this characteristic became an

³⁶ The utility of an individual is a metaphysical concept and strictly spoken cannot be aggregated at all, as such it is pretty useless for welfare analysis. Nevertheless the somewhat vague idea of welfare of society survives in the utilitarian sense of Bentham: the greatest happiness for the greatest number [Bentham, 1780].

³⁷ See [Hanappi, 2010a] for further ideas on this topic.

internal characteristic of the species³⁸. Its outstanding success was that it enabled the wide-ranging substitution of direct coercive action by means of symbolic interaction. First in small tribes, later on in always larger and more sophisticated settings knowledge written down in language eased the struggle for survival. The 20th century proved that a major threat for that survival comes from wars within the human species itself. Again the hope now is that intelligent scientific intervention can help to avoid the worst. ***In the very long run*** the perspective seems to be that ***science is in a continuing conflict with the exertion of brutal coercive forces*** – symbolic anticipation and symbolic interaction superseding brutal physical attack, democratic mechanisms superseding unjustified dictatorship, and so on. While this tendency probably prevails in the long-run (an optimistic perspective), there ***certainly is counter-movement in the short-run***. Not only that sudden military demand usually also initiates a boom in the finance of military-oriented science, which then spreads to all corners of scientific activity. As the current surge in military expenditure in many countries of the world, as well as the boom in the organization of international criminal activity show, it is perfectly possible that times with only dispersed, small-scale military conflicts coincide with vivid scientific activities. Both sets accompanying human evolution – disaster and progress – are thus not always excluding each other, temporarily might even run in parallel. But as the enormous brain drain from Europe to the USA, which accompanied WW2 shows, there come knots in time at which the streams depart. Any global crisis like the current one makes the fallback to directly coercive regimes in some countries more likely, even a domino effect might then occur. For scientists it is thus an era of being increasingly alarmed, of the necessity to be ready to realize a state of emergency in time, of developing implementable visions serving as alternatives to renewed criminal and military oppression. In this sense ***coercion exerted by criminal military and militant criminals*** on the one side and ***science promoting civil progress*** on the other side ***are coupled to each other***.

The journey along the six cornerstones leads back to where it began. At the last corner the most urgent task of science, to help to prevent a fallback into barbarism, was addressed – and all this followed from the phenomena by which the crisis manifested itself in the first place, the liquidity crisis of banks and states. As a solution of the question where to place funds to achieve a high profit rate is not in sight in civil societies, and the finiteness of possibilities in an already conquered globalized world leaves no hope that this will change. What is more straight forward in such a situation than to invest in coercive action, crime and (still local) war? This is a grim outlook for science - though a highly motivating one.

³⁸ For a specific treatment of the concept of knowledge compare [Hanappi, 2007].

Conclusion

The parable presented in this paper has meandered through many, mostly unconventional scientific areas to provide a richer background of the picture of Europe's political future that it draws. The realization of this future is not only subject to many not yet known risks, it is also permanently attacked by groups with vested interests – and usually little foresight power. In 2008 the world has entered a period of increasing instability – despite the monthly repeated propaganda that the crisis now has been mastered – and the new combination of old elements of political economy is on the agenda. This probably will take at least some five further years of prevailing confusion and local turmoil, at best.

European renaissance as a pilot project of human emancipation is possible, but it takes a lot of scientific work plus political practice.

Bibliography

- Aghion Ph. & Howitt P., 1998, **Endogenous Growth Theory**, MIT Press.
- Barro R. & Sala-i-Martin X., 1995, **Economic Growth**, McGraw-Hill, New York.
- Bentham J., 1780, **An Introduction to the Principles of Morals**, Batoche Books Kitchener (2000). Download: <http://www.ecn.bris.ac.uk/het/bentham/morals.pdf>
- Cimoli M., Dosi G., and Stiglitz J., 2009, **Industrial Policy and Development. The Political Economy of Capabilities Accumulation**, Oxford University Press, New York.
- Frank A.G., 1978, **Dependent Accumulation and Underdevelopment**, Macmillan Press, London.
- Hanappi H., 1989, **The Stages of Industrial Capitalism**, in: A.Vercelli et al. (eds.), **Technological and Social Factors in Long Term Fluctuations**, Springer, Berlin, Heidelberg, New York.
- Hanappi H., 1994, **Evolutionary Economics**, Avebury Press, Aldershot.
- Hanappi H., 1999, **Die Zukunft des Geldes**, Wiener Studien zur Politischen Ökonomie, Band 13, Vienna (Austria). Download : http://www.econ.tuwien.ac.at/hanappi/Wispo/wispo_13.pdf
- Hanappi H. & Hanappi-Egger E., 2004, **New Combinations. Taking Schumpeter's concept serious**, Proceedings of the International Schumpeter Society Conference 2004 in Milano (Italy), June 9-12, Bocconi University. Download : <http://ftp.econ.tuwien.ac.at/hanappi/Papers/iss2004d2.zip>
- Hanappi H. & Hanappi-Egger E., 2006, **Aging - Knowledge Accumulation – Capital Accumulation. Technical and social innovations in aging societies**, paper presented at the 11th ISS Conference on 'Innovation, competition and growth: Schumpeterian perspectives' in Sophia-Antipolis, Nizza (France), 22-24 June 2006. Download : <http://ftp.vwl.tuwien.ac.at/hanappi/Papers/iss2006HE.pdf>
- Hanappi H., 2007, **On the Nature of Knowledge**, invited paper presented at the Ausschuss für Evolutorische Ökonomik (Verein für Socialpolitik) in Münster (Germany), July 5-7, 2007. Download: http://ftp.vwl.tuwien.ac.at/hanappi/Papers/Knowledge_D3.pdf
- Hanappi H. & Rengs B., 2008, **On the Eve of Global Financial Collapse. Explanations, necessity, and policy conclusions**, paper presented at the International Conference of EAEPE in Rome (Italy), November 6-8, 2008. Download : <http://ftp.vwl.tuwien.ac.at/hanappi/Papers/EAEPE2008.pdf>
- Hanappi H., 2010a, **The Beat of Visions**, paper contributed to SGIR 2010 in Stockholm, September 2010. Download : http://www.econ.tuwien.ac.at/hanappi/Papers/Hanappi_2010b_05-09-2010.pdf
- Hanappi H., 2010b, **Shangri-La Governance. A Sketch of an Integral Solution for European Economic Policy derived from a Synthesis of Europe's Problems**, , working paper contributed to the EU Project 'Systemic Crisis'. Download : http://www.econ.tuwien.ac.at/hanappi/Papers/Hanappi_2010e.pdf
- Helmstädter E., 1989, **Die Wirtschaftsordnung in der Bundesrepublik Deutschland: Soziale Marktwirtschaft**, in: [Weidenfeld & Zimmermann (eds.), **Deutschland-Handbuch**, Bonn 1989, pp. 241-257.
- Hobsbawm E., 1962, **The Age of Revolution 1789-1848**, Weidenfeld & Nicolson, London.
- Jevons S., 1871, **The Theory of Political Economy**, MacMillan & Co. , London.
- Keynes J.M., 1921, **A Treatise on Probability**, Collected Works, London.

- Mandeville B., 1714, **The Fable of The Bees: or, Private Vices, Publick Benefits**. Clarendon Press, Oxford.
Download:
http://oll.libertyfund.org/?option=com_staticxt&staticfile=show.php%3Fperson=3870&Itemid=28
- Marx K. & Engels F., 1848, **On the Question of Free Trade**, MECW Volume 6, p. 450. Download:
<http://www.marxists.org/archive/marx/works/1848/free-trade/index.htm>
- Marx K., 1850, **Die Klassenkämpfe in Frankreich**, in: MEW Bd. 7, pp. 9-108.
- Marx K., 1852, **The Eighteenth Brumaire of Louis Bonaparte**, translated by Saul K. Padover from the German edition. Download: <http://www.marxists.org/archive/marx/works/1852/18th-brumaire/>
- Mattick P., 1969, **Marx and Keynes. The Limits of the Mixed Economy**, Extending Horizons Books/Porter Sargent Publisher Boston.
- Meek R. 1973, **Studies in the Labour Theory of Value**, The Camelot Press, Southampton.
- Menger K., 1871. **Principles of Economics**, Vienna.
- Neumann J. v. & Burks A., 1966, **Theory of Self-Replicating Automata**, University of Illinois Press.
- Nolan P., Zhang, J. and Chunhang, L., 2007, **The Global Business Revolution and the Cascade Effect**, Palgrave, Basingstoke.
- Penrose R., 2004, **The Road to Reality. A Complete Guide to the Laws of the Universe**, published by Jonathan Cape, London.
- Phelps E., 1961, **The Golden Rule of Accumulation: A Fable for Growthmen**, American Economic Review, vol. 51 (September 1961).
- Roemer P., 1990, **Endogenous Technological Change**, Journal of Political Economy, 98(5), pp. 71-102.
- Schumpeter J., 1911, **Theorie der wirtschaftlichen Entwicklung**, Duncker & Humblot, Berlin.
- Schumpeter J., 1939, **Business Cycles**, McGraw-Hill, New York.
- Sohn-Rethel A., 1936, **Economy and Class Structur of German Fascism**. CSE Books. London.
- Solow R., 1956, **A Contribution to the Theory of Economic Growth**, Quarterly Journal of Economics, vol.70, pp. 65-94.
- Walras L., 1874, **Elements of Pure Economics, or the theory of social wealth**, Guillaumin et Cie, Paris.
- Watts D., 1999, **Small Worlds. The Dynamics of Networks between Order and Randomness**, Princeton University Press.