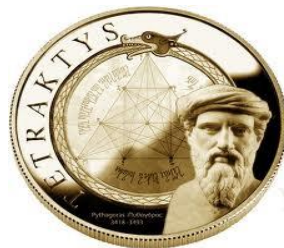
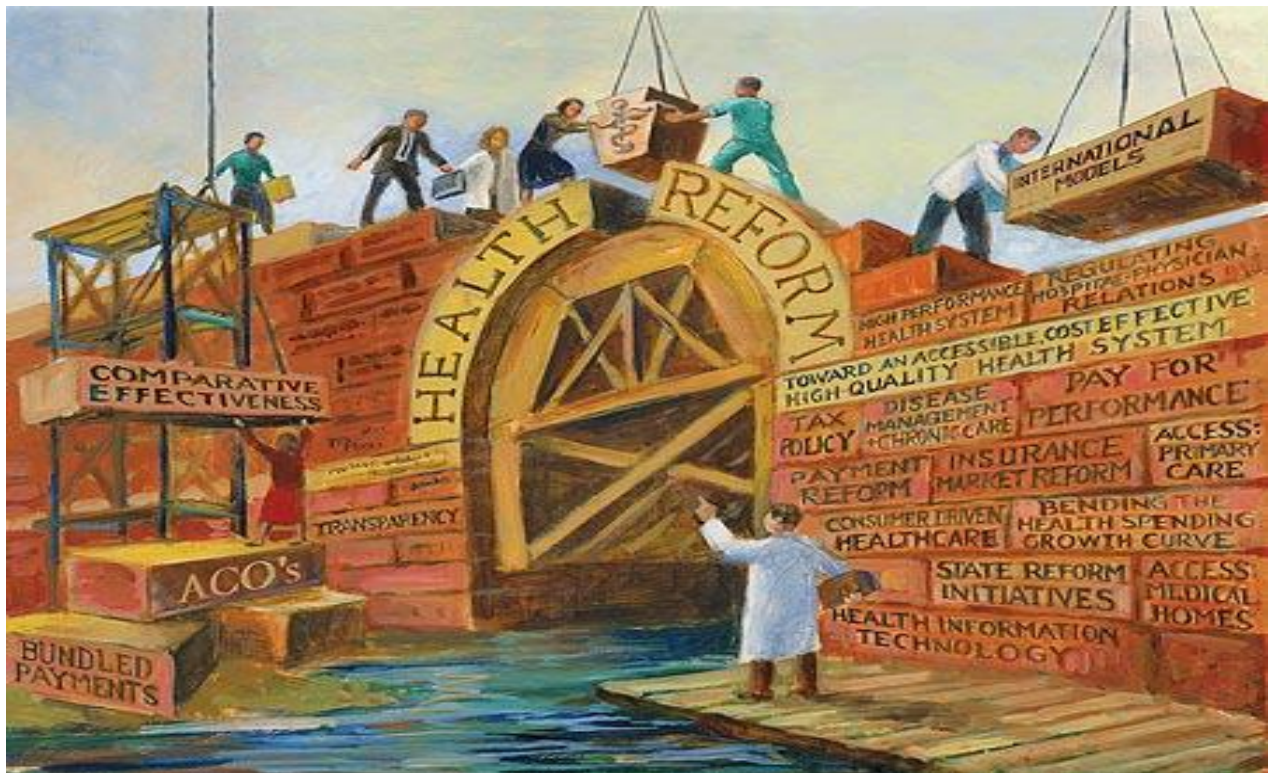


Shaping the relationship of Academia, State and Industry in Health Policy: Pythagoreans' Tetraktys application to Triple Helix model of Innovation



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Abbreviations

Knowledge-Based Economy	(KBE)
Organization for Economic Co-operation and Development	(OECD)
Triple Helix	(TH)
Trade-Related Aspects of Intellectual Property Rights	(TRIPS)
World Trade Organization	(WTO)
General Agreement on Tariffs and Trade	(GATT)
International Monetary Fund	(IMF)
Research and Development	(R&D)
Intellectual Property Right	(IPR)
Intellectual Capital	(IC)
Parallel distributors	(PDs)

Summary

Getting deeper and deeper into the “parallel world” of pharmaceuticals and in my effort to locate a solution to the so-called problem of R&D sustainability which represents a great challenge for Health Policy makers, I found myself exploring the nature of capitalism and its political, economic and societal manifestations. What I discovered in the very beginning of my studies is that I cannot address the problem of trade-off between access to health and sustainability of Research and Development (R&D) without putting emphasis on the systemic interaction of this relationship. Demonstrating this relation requires a critical view of the capitalistic forces, commonly presented by notions such as markets, pharmaceutical companies, investors and their institutional reincarnations.

The political, economic and societal evolution is bind to coexist with a general profit-oriented mentality and avarice appetite of markets. Nowadays, Health Policy can be located very high in the political agenda of governing parties whose role is limited chiefly by removing barriers to the free market through appropriate property policies, free trade agreements, neutral impact taxation and limited regulation of enterprises which among others raise concerns in terms of economic sustainability, political stability and societal peace. On one hand, it is the undisputable manner in which WTO treat environmental, public health and human rights protection as obstacles to trade that should be eliminated and on the other hand, are new millennia challenges which combine globalization, climate change and an unimaginably increasing ageing population let alone the moral obligations which raise the establishment of profit-oriented values transforming the old citizen into the new consumer.

Companies in highly regulated pharmaceutical industry, such as health care immerge in markets characterized by a number of potential market failures such as under-investment for particular diseases, free-riding behavior concerning the use of R&D, and information asymmetry between professionals and clients on various levels. Those reasons explain the extensive regulation of the sector. The attempts to avoid the negative effects of market failures and to pursue public health goals have led to wide-ranging national policy mixes that further influence regulations of pharmaceuticals. These regulations are important to maintain incentives for R&D, to prevent unsafe products from entering the market and to help reduce costs of pharmaceuticals and medical treatment.

Health care policy is often seen like navigating “between Scylla and Charybdis”. Attempts to avoid market failure may result in government failure and vice versa. In Homer’s epic poem, *The Odyssey*, hero Odysseus encounters danger from all manner of man, beast and nature during his decade-long voyage home after the Trojan War. During his trek, Odysseus attempts to travel through a narrow strait guarded on one side by Scylla, a hydra-headed monster, and on the other by Charybdis, a demon who continually inhaled huge quantities of water along with those floating on it. Efforts to avoid one necessarily increased the chance of being attacked by the other. Odysseus’ name means “trouble” in Greek, referring to both the giving and receiving of trouble—as is often the case in his wanderings. What really distinguishes Odysseus is his heroic trait *mētis*, or “cunning intelligence”. Let us now assume that it is Health policy which is navigated through market and government failures. And if we go one step further away? What if humanity is navigated through market and government failure? What would be the solution if not the cunning intelligence. A situation which occurs, involving three institutional

spheres- to use to meaningful and significant words to describe a ternary relation between University, Government and Industry is deemed as the center of this thesis. This relationship, commonly known, as the Triple Helix model of innovation is increasingly presented as the main source of innovation all around the world.

Given its broader public health and developmental implications, access to essential medicines has become a central topic at the international policy-making level, not simply as a moral issue, but as a fundamental human rights affair. Despite myriad programs aimed at increasing access to essential medicines in the developing world, the global drug gap persists. In the case of pharmaceutical markets, a plethora of Health Policy solutions are prevented by major political and legal constraints known as Trade-Related Aspects of Intellectual Property Rights (TRIPS). Even though policies exist so as to mitigate the restrictive impact of TRIPS such as greater use of TRIPS flexibilities, advancement of human rights or even an ethical code of distribution of drugs, the cause of calamity is emerging through the current patent system and recent political and societal evolution that takes place the very moment that these lines are written. Democratic capitalism is characterized by a repeated oscillation between private and state capitalism. This perpetual shift from one form of capitalism to the other clearly expose the latter's fatal vulnerability and as the current crisis deepens it is becoming more apparent that state intervention through increased level of transparency is vehemently needed. The real challenge though, is not merely shift to another form, as in the past but rather go beyond these two central ideologies towards what modern authors present as knowledge Based Era.

Research question

In my thesis I struggle to gather empirical evidence and further expand the normative framework, one that evolves the current patent system for new medicines following recent trends of innovation policy resulting from an outcome of interactions among Government, University and an internal development within pharmaceutical industry, a relationship adequately described by Triple Helix model of Innovation. While a variety of alternative schemes for patent systems have been offered such as Medical Research and Development Treaty (MRDT) and others¹, virtually all come down to great reliance on government to fund the R&D process of new drugs (DiMasi, Grabowski, 2007). The role of government was always considered as a milestone in shaping Innovation as well as Health financing policy and there is clear empirical evidence for that². Furthermore, the pharmaceutical sector is a knowledge based manufacturing industry and is deemed as an important part of the health care sector since it is

¹ See Kristina M. Lybecker, (2011), Innovative Proposals for Incentivizing Drug Development, Drug Development - A Case Study Based Insight into Modern Strategies, Chris Rundfeldt (Ed.)

² see National Health Accounts (NHA) that provides evidence to monitor trends in health spending for all sectors- public and private, different health care activities, providers, diseases, population groups and regions in a country. It helps in developing national strategies for effective health financing and in raising additional funds for health. Information can be used to make financial projections of a country's health system requirements and compare their own experiences with the past or with those of other countries.

responsible for the production of vital drugs. The role of University is more than critical in shaping policies and is evolving into an institutional sphere with various potential capabilities.

Thus, the research question which occurs answers to whether the Triple Helix model of Innovation is able to improve Health Policy and promote Welfare State”.

Objectives

The main goal of this thesis is to establish a theoretical framework which promotes a productive social interaction between Governments, Universities and Pharmaceutical Industry. Law, politics and economy are inextricably linked in an unstoppable process of evolution. The Triple Helix of innovation will radically change not only the way we perceive production of drugs but also the general political, economic and societal reality. In this respect, the patent system is also under evolution. This thesis also demonstrates an expanded version of Triple Helix of Innovation that is based on Pythagorean Tetraktys.

My work contributes to the ongoing debate of R&D sustainability as well as to the expansion of the application and theory of triple Helix model of innovation in the domain of pharmaceuticals in an effort to promote cooperative treatment of patent system between Universities, Government and Pharmaceutical Industry while simultaneously acknowledges the power of monopoly, political reality and last but not least, the right to health. Being fully aware of the consequences which raise such a claim I will try to shed some light in the bigger arena within capitalism and its projection to the pharmaceutical sector in the form of patent rights whose purpose is to establish monopolies in order to recoup the investment done during the R&D process and therefore secure the financial sustainability and continuation of development of new drugs.

Methodology

The dualism between natural science and humanities cultures is not new. Positivism and anti-positivism have too long haunted the discussion on the fundamentals of social science and therefore social scientists are divided into camps of support for particular research techniques. On the face of this, few things are ever black and white, especially when it comes to research with an utterly interpretive component. One of the most influential method in Social Research is Grounded Theory which is ideal in generating new theory from data-as opposed to testing existing theory-and one of the most widely used and well-described methodologies in the social sciences. Grounded theory is most often derived from data sources of a qualitative (interpretive) nature. Rather than argue on the best genre of grounded theory (since essential grounded theory methods are multi-faceted) in this thesis I preferred to deploy both postmodernist and constructivist epistemological arguments in an effort to establish a theoretical framework normative in its content so as to promote a productive social interaction of Academia, State and Industry.

The Grounded Theory offers a robust research design that combine a methodology which is a set of principles and ideas that inform the design of a research study with methods which are practical procedures that we use to generate and analyze data and finally with the philosophical beliefs since

methodology and theoretical/philosophical foundations are inevitably related in any research endeavor. This thesis follows a qualitative analysis based on grounded theory methodology while the method used was an advanced coding and theoretical integration which provides a comprehensive explanation of a process or scheme apparent in relation to particular phenomena. Since for this research methodology data can be everything, in my effort to reach my goals, I had to employ articles whose content range wide from econometric information and political manifestations to law and philosophy in an attempt to cover the area as comprehensively as possible. Grounded theory methodology involves a process of coding. Coding refers to categorization of segments of data with a short name that simultaneously summarizes and accounts for each piece of data. The coding data were collected in relation to the concept of Triple Helix model of innovation, thus Academia, State and Industry are embedded within my hypothesis as concepts and need to be translated into researchable entities. A critical examination of existing research in Pharmaceutical industry, Welfare State and University took place relating to the phenomena of interest and of relevant theoretical ideas.

Of fundamental importance for the first chapter which introduce the reader into the subject of my thesis were two articles: published by Wolfgang Streeck, "The Crisis in Context: Democratic Capitalism and its Contradictions" as well as "Economic Crisis from a Socialist Perspective, Socialism and Democracy" written by Marxian Economist Rick Wolff who defined and delineated the oscillation of capitalism. I believe that words coming from Sociologists and Marxian economists account for a constructive opposition to what mainstream economists or politics could argue. A variety of articles/documents about TH model of innovation and Knowledge based Economy were cited in an effort to describe adequately both notions with a focus on the original thinkers of the TH model so as to increase the validity of my arguments.

Introduction

The first chapter starts by reviewing updated literature about Democratic Capitalism. Democratic capitalism, also known as capitalist democracy, is a political, economic, social system and ideology based on a tripartite arrangement of a market-based economy based predominantly on a democratic polity, economic incentives through free markets, fiscal responsibility and a liberal moral-cultural system which encourages pluralism. A status of political economy that results in benefits and drawbacks. Falling government services, falling real wages, falling employment opportunities, rising debts for our students, rising debts for our people and at some point the very system you gave praise to when it delivered, has to been given the criticism when it doesn't. Otherwise you are not being serious and I think we desperately need to ask and answer the question. Is capitalism, whatever its virtues of the past able to deliver the goods now?" These are the words of Richard Wolff in an interview on RT-TV. Wolfgang Streeck believes that the current crisis that Europe and the rest of the world undergo can be fully understood only when considered as one more stage in an ongoing, inherently conflictual evolution and transformation of that very particular social formation that we call democratic capitalism. In this chapter we will get some insight on Democratic capitalism and its oscillations between state capitalism and private capitalism that took place in the past. I believe that history is important in order to forge a path for the future and thus the only way to improve ourselves in future times is to know of our past mistakes and successes. How WTO treats Public Health with it so called TRIPS agreement? What are the implications for Health in this concept? These are some questions that academics around the world strive to approach from different perspectives in a wide range of disciplines. The first chapter focuses on Democratic Capitalism and its contemporary neoliberal form of expression .This chapter also facilitates the passage to the notion of Knowledge-based economy where terminologies such as Human Capital, Social Capital and Public Education are of crucial importance and therefore are analyzed in order to achieve the goal of this thesis. Loet Leydesdorff one of the theorists of TH model argue that organized Knowledge production has more recently added a third coordination mechanism to the social system in addition to economic exchange relations and political control (Leydesdorff,2006;Gibbons et al.,1994;Schumpeter, 1939; Whitley, 1984).

The second chapter introduces an extended version of TH model specially designed for the purpose of this thesis in case of pharmaceutical markets. Running through the triple Helix literature review I will expand this so called innovation instrument in Tetraktys model inspired by Pythagorean geometric applications. Tetraktys retains the dynamics of TH model and describes in the same way the ternary relationship of Universities- Government-Industry. What changes though is the form of TH model as tool as well as its functionality. Tetraktys model combined with the dynamics of Triple Helix model shows a way to conceptualize and present graphically the oscillations between three states of capitalism most notably Private Capitalism, State capitalism and knowledge Capitalism and even go one step beyond and give some food for thought. Does a knowledge-based economy operate differently from a market-based or political economy or it just the political economy which dictates the treatment of the other institutional spheres is a question that subconsciously co-exists alongside with my research question. Tetraktys model of innovation demonstrates a post capitalism scenario, one that needs an alternative political economy and social coordination to be realized.

The third chapter is devoted to Innovation and particularly to the source which produce the purest and most efficient element of innovation and one which monopolize the focus of attention in this chapter, University and the role that plays in knowledge based society. The shape of modern University is evolving into an institutional sphere interacting directly or indirectly with Pharmaceutical Industry and Government regulation. This is a great challenge and it is obvious that Governments' role in this project is considered vital to balance the interests of markets and modern democratic States. What do the statistics say? In this part of my thesis I shall provide evidence of the current pace of innovation that is undergone within the limits of the two conflicting regional model of innovation most notably, the Anglo-American capitalistic and the market socialistic represented mainly by China . Austerity measures have shadowed future development of innovation activity in Europe and US while China progress is more than apparent. Is there a more energetic role for Universities in shaping innovation?

The forth chapter provides a summary of the main market characteristics of Pharmaceutical Industry in general and for the EU specifically provides important background information for the subsequent topics that I address such as R&D funding, Parallel Trade as well as the current patent system . It shows just how complex the pharmaceutical industry is due to its unique combination of market characteristics and the complicated interrelationships between many different stakeholders from the public and private sector. Existing governmental actions to overcome market failure incorporates patent protection (in EU 20 years). This market failure results in tension between pursuit of profit and improving public health. Is the current patent system able to generate what knowledge-based societies need? For an increasing number of authors following an innovation perspective this is the result of current patent system so I am going to investigate the implication posed by strong protection of innovation.

While in the previous chapters I approached the Innovation main contributor, the University itself and the industry representative which is none other than the pharmaceutical markets, now it is high time to focus on States and in case of European Union, the member states responsible to attain a specific level of Welfare to its citizens. The most influential and debatable work of Esping- Andersen, the Three Worlds of the Welfare Capitalism, provides the guidance to categorize and analyze the quality of Welfare States while some others try to show its correlation with Health. While individualism is the central idea of the current global political and economic, negative integration within the walls of European Union is expanded through the obedience in trade obligations and market expansion. The role of Welfare State is problematic but also promising but given the current crisis the role of government should be omnipresent so as to promote a more positive integration.

The last chapter is devoted to the two main contributors of this work. Is there any relationship between a mystical mathematic symbol and a political-phylosophical manifestation or else between Pythagoras' Tetraktys and Plato's Republic?

1. Democratic Capitalism under pressure

1.1 Navigating “between Scylla and Charybdis”.

“The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed, the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slave of some defunct economist.”

-John Maynard Keynes

Wolfgang Streeck in his article “The Crisis in Context: Democratic Capitalism and Its Contradictions” characterizes democratic capitalism as a political economy ruled by two conflicting principles, or regimes of resource allocation: the first operates according to marginal productivity, or what is revealed as merit by a “free play of market forces,” and the other following social need, or entitlement, as certified by the collective choices of democratic politics. Governments under capitalism in their effort to cope with these two principles which are never fully complementary to each other cannot discriminate in favor of each without facing the dire consequences of their options (Streeck, 2011). History provides us with sound empirical evidence that capitalism has swung back and forth between private and state forms in its past. Capitalism has always and everywhere oscillated between these two phases of private and state sort of capitalism. The first phase is characterized by relatively little state intervention; laissez-faire, neoliberal, private capitalist, and conservative have been names for this phase. The other phase exhibits the state intervening relatively more via taxation, regulations, controls and more or less outright ownership and operation of enterprises. Keynesian, welfare-state, state-capitalist, and social democratic have been the adjectives commonly applied in the second phase (Wolff, 2009). Both scientists among others verify the oscillation that takes place described it from various perspectives.

During the last century nations around the world experience two crises that were about to change each time their perceptions and attitudes toward the ruling form of capitalism that should be on effect in order to deal with unpleasant situations of high inflation, unemployment rate and growing interests rates. First it was the great Depression preceding WWI. In the US, a crisis of private capitalism in the late 1920s was associated with oscillations to state capitalism, to welfare state economics, and to the Democratic Party and many critics accused then crisis-ridden private capitalism of economic waste and inefficiency, deepening social inequalities, and undermining democracy by causing falling employment, production, and income. These critics demanded, in effect, a transition to state capitalism on the grounds that it could and would improve economic performance, reduce inequalities and enhance democracy (Wolff, 2009). This successful transition lasted for few decades but it was only in the beginning of 70s when high economic growth came to an end and severe stagflation aggravated state capitalism’s mounting problems and brought on a crisis in the US (Wolff, 2009). For Rick Wolff the crises of state-interventionist form of capitalism that took place in the 70s demanded a change to more private forms of capitalism. In other words, government failures presage after a period of time more complex market failures in a vicious circle of shifting from State to Private “sort of things” and vice versa. The 2008–2012 global recession, sometimes referred to as the late-2000s recession, Great Recession, the Lesser Depression or the Long Recession , is a marked global economic decline that began in

December 2007 and took a particularly sharp downward turn in September 2008. The Great Recession has affected the entire world economy, with higher detriment in some countries than others. It is a major global recession characterized by various systemic imbalances and was sparked by the outbreak of the 2007–2012 global financial crisis.

By 2005 Private Capitalism celebrated his 30 years of business cycles and economic problems by making marginal adjustments to its regime of tax cuts, deregulation of business and privatization of enterprises. “From Reagan through George W. Bus, private capitalism thrived” (Wolff, 2009). Wolff illustrates that US policies of cutting rising real wages³ from 1820 to 1970 was the reason of such a success. In effect, what capitalists paid US wage laborers per hour remained roughly constant, while the value derived of their output per labor hour rose. This is line with what Willis and Wroblewski have noticed during the past few years that the share of income paid to labor has been falling, while corporate profits have surged (Willis and Wroblewski, 2007). Likewise, the inequalities of wealth and income in the US, Europe and the rest of the world.

Wealth inequalities are(or at least should be) of particular interest among economists. Adam Wagstaff in his work *Inequalities in Health in Developing Countries: Swimming against the Tide?* presented clear evidence from trends in health inequalities(in both developing and developed countries) in support of the idea that health inequalities rise with rising per capita incomes⁴. Empirical evidence show that the association between health and inequality and per capita income is probably due in part to technological change going hand- in-hand with economic growth, coupled with a tendency for the rich to adopt new technology faster than the poor (Wafstaff, 2002). Therefore, real wages converted into insurance of private or public origin, out-of-pocket expenditures and generally money as a way to satisfy our needs including the higher of all, health itself depends on salaries that for quite a period now are overshadowed by the invisible hand of market uncertainty.

After 1975 and the passage to the private capitalism as Wolff indicates labor and capital reacted very differently with workers dazzled by the end of rising real wages and deeply committed to the rising level of consumption choosing between two ways to pay for rising expenses. They worked and borrowed more (Wolff, 2009).As regards work, Wolff recognizes the socially consequential difference between US and Europe is expressed by comparing the gap of 1,817 average annual hours per worker in the US and 1,446 in Germany while in the UK average annual hours per worker was 1,619. Regarding borrowing since the additional hours of labor did not yield sufficient extra net income people in US started borrowing money via mortgages and credit cards. According to Federal Reserve, US household debt was

³ From 1820 to 1970, average real wages in the US rose every decade. The US working class came to deeply expect and presume that each generation would live better than the previous one. Individuals and groups (such as waves of immigrants) increasingly measured their self-worth and their achievements in terms of the rising standards of consumption they enjoyed. Starting in the mid-1970s, this long history of rising real wages ended; real wage stagnation has been the reality ever since.

⁴ Per Capita income can be measure by total national income (GDP) divided by total population. It is not the average income (because it includes children and non-working population) but serves as an indicator of a country's living standards.

60% of annual disposable income ⁵ while by 2007 this amount had skyrocketed to 120 % of annual disposable income. An interesting observation is that in 1929, at the peak of the bubble that burst into the Great Depression, household debt has reached 30% of disposable income (Wolff, 2009). In reality, since the mid-1970s, workers keep receiving increasing loans instead of increasing wages as a reward of their effort while the true benefits were delivered to employers in the form of profits coming from an unprecedented boom of the stock market between 1980 and late 1990 (Wolff, 2009).

Far from being able to generate a more equitable and sustainable system, the dominance of contemporary Neoliberalism⁶ progressively resulted in a new crisis which most countries undergo from 2008 with devastating consequences for countries and their economies. While the major cause of this crisis can be detected to the extended use of supply side economics as happened in 1929, the solution to the crisis involves extended control on behalf of States and demand-side economics most notably Keynesian macroeconomics. The term “supply-side economics” is used in two different but related ways. Some use the term to refer to the fact that production (supply) underlies consumption and living standards. In the long run, our income levels reflect our ability to produce goods and services that people value. Higher income levels and living standards cannot be achieved without expansion in output. Virtually all economists accept this proposition and therefore are “supply siders” (Gwartney and Lawson, 2003). Paul Krugman in his book *The Return of Depression Economics And The Crisis Of 2008* confirms that demand-side macroeconomics has a lot to offer in the current situation which occurs in the globe but continues saying that the defenders of demand-side economics⁷ lack in conviction while the critics most notably neoliberal combined with mainstream economics⁸ are filled with passionate intensity (Krugman, 2009). He also admits that demand side economics have proved to be a tool of practical success especially when it comes to “get an economy out of recession, central banks have repeatedly gone ahead and used it to do just that—so effectively in fact that the idea of a prolonged economic slump due to insufficient demand became implausible” (Krugman, 2009).

Thomas Palley in his essay which appears as a chapter in a book by Deborah Johnston and Alfredo “Neoliberalism--A Critical Reader” pinpoints the two critical tenets of neoliberalism to be the theory of

⁵ Disposable Income is measured by the amount of money that households have available for spending and saving after income taxes have been accounted for. Disposable personal income is often monitored as one of the many key economic indicators used to gauge the overall state of the economy.

⁶ Contemporary neoliberalism is principally associated with the Chicago School of Economics, which emphasizes the efficiency of market competition, the role of individuals in determining economic outcomes, and distortions associated with government intervention and regulation of markets. Key figures in the Chicago School are Milton Friedman, George Stigler, Ronald Coase and Gary Becker—all of whom have been awarded the Nobel Prize in economics.

⁷ Demand-side economics is an economic theory which suggest that economic stimulation comes best from increasing the demand for goods and services. Also called Keynesian economics, after John Maynard Keynes, this concept is usually placed in direct opposition with supply-side economics, which suggests that stimulation is achieved through increasing the supply of goods and services.

⁸ Mainstream economics is a term used to refer to widely-accepted economics as taught across prominent universities, and in contrast to heterodox economics. It has been associated with neoclassical economics and with the neoclassical synthesis, which combines neoclassical methods and Keynesian approach macroeconomics.

income distribution and the theory of aggregate employment determination. With regard to income distribution, neoliberalism asserts that capital and labor(production) get paid what they are worth. In the process of supply and demand the payment depends on a factor's relative scarcity(supply) and its productivity which then affects demand (Palley, 2004). Neoliberal policy in this case has sought to promote the cause of labor market deregulation. In practice this is done by allowing the real value of the minimum wage to fall, undermining unions, and generally creating a labor market climate of employment insecurity. The result has been widening wage and income inequality (Palley, 1998; Mishel et al., 1999).With regard to aggregate employment determination, neoliberalism asserts that free markets will not let valuable factors of capital and labor (production) to go waste. Prices will adjust to ensure that demand is forthcoming and that all factors are employed and this is a fundamental foundation of Chicago School monetarism, which claims that economies automatically self-adjust to full employment and that the use of monetary⁹ and fiscal policy¹⁰ on behalf of government to permanently raise employment that merely generates inflation. These two theories have been extraordinarily influential, and they contrast with the thinking that held sway in the period between 1945 and 1980 while the previous era, the dominant theory of employment determination was Keynesianism, which maintains that the level of economic activity is determined by the level of aggregate demand. For Keynesians, capitalist economies are subject to periodic weakness in the aggregate demand generation process, resulting in unemployment. Occasionally as exemplified by the Great Depression, this weakness can be severe and produce economic depressions. In such a world, monetary and fiscal policy can stabilize the demand generation process. Palley indicates also that income distribution is the reason why Keynesians have always been divided, and this created a fatal breach that facilitated the triumph of neoliberalism. American Keynesians (known as neo-Keynesians) tend to accept the neoliberal "paid what you are worth" theory of income distribution, while European Keynesians (widely associated with Cambridge, U.K., and known as post-Keynesians) reject it. Instead, post-Keynesians argue that income distribution depends significantly on institutional factors. Thus, not only does a factor's relative scarcity and productivity matter, but so does its bargaining power, which is impacted by institutional arrangements. This explains the significance of trade unions, laws governing minimum wages, employee rights at work, and systems of social protection i.e unemployment insurance. Finally, public understandings of the economy also matter, since a public that views the economy through a bargaining power lens will have greater political sympathies for trade unions and institutions of social protection (Palley, 2004).

⁹ Monetary policy is conducted by central banks, who manage interest rates to affect the level of economic activity.

¹⁰ Fiscal policy refers to government management of spending and taxation to affect economic activity.

1.2 Marginal Productivity versus Social Benefit

“The economic anarchy of capitalist society as it exists today is, in my opinion, the real source of the evil. We see before us a huge community of producers the members of which are unceasingly striving to deprive each other of the fruits of their collective labor -- not by force, but on the whole in faithful compliance with legally established rules. In this respect, it is important to realize that the means of production -- that is to say, the entire productive capacity that is needed for producing consumer goods as well as additional capital goods -- may legally be, and for the most part are, the private property of individuals”.

-Albert Einstein

Appreciating the difference between crises in and of capitalism, is crucial for socialists according to Rick Wolff. He ought to believe that crises within capitalism are not only endured but sometimes they are also managed by changing capitalism's form. In US today, a serious crisis in a “private” sort of capitalism which means relatively less state intervention and control of productive property and markets provokes a change to a “state” form of relatively more state intervention strategy (Wolff, 2009). New-Keynesian economics is a school of contemporary macroeconomics that strives to provide microeconomic foundations for Keynesian economics. As economic school of thought it entails extended government control due to market failures such as imperfect competition or failures to attain full employment, coming from governments' fiscal Policy or by central banks' monetary policy that can lead to a more efficient macroeconomic outcome than a laissez faire would. Paul Krugman a new Keynesian economist forecasts a bigger and broader recapitalization that will entail an important degree of governmental control elevating to the point of “temporary nationalization of a significant part of the financial system”. Faithful to the dogma of laissez faire he does not forget to specify that this will not be” a long-term goal, a matter of seizing the economy's commanding heights: finance should be reprivatized as soon as it's safe to do so” highlighting the example of Sweden which privatize the banking sector after its bailout in the nineties (Krugman, 2009) .He notes that such a process has to take place “without getting tied up in ideological knots”. I believe it is high time for us to include in this analysis a societal perspective and get some insights whether Neoliberal Governments live up with the expectations of modern democratic countries and finally decide whether it is worth” scratching old ideological wounds”.

Really how does Democracy look like today? Contemporary Neoliberalism holds the reigns of political, economic and therefore societal evolution which is bind to coexist with a general profit-oriented mentality and avarice appetite of markets. Paul Treanor in his article “Neoliberalism: Origins, Theory, Definition” defines Neoliberalism as “the philosophy in which the existence and operation of a market are valued in themselves, separately from any previous relationship with the production of goods and services . . . and where the operation of a market or market-like structure is seen as an ethic in itself, capable of acting as a guide for all human action, and substituting for all previously existing ethical beliefs.” He also evokes images of an opposing relationship between supporters and opponents of the free market to be equal with a contradiction between democrats and anti-democrats. It goes without saying that, they are considered enemies, inherently. He believes that on the very existence of the market, no compromise is possible. “The free market either exists, or it does not exist” (Treanor, 2005). Any attempt to end the free market leads to an attempt equal of overthrowing the very fundamental

social structure and especially in the case of the long-established western market democracies, would mean a collapse of the existing social structures. The effect would be dramatic, even comparable to occupation by a foreign power (Treanor, 2005). At this moment I consider vital to summon one of the fundamental establishers of neoliberal politics, Friedrich von Hayek whose ideas about economic freedom and civil liberty reached the point of abolishing democracy (Streeck, 2011). Hayek In the 2nd volume *Law, Legislation and Liberty*, published in 1976, do not hesitate to call the idea of social justice¹¹ a "mirage, a phrase that meant nothing at all, a vacuous concept, a quasi-religious belief with no content what so ever etc" (Hayek, 1976). Hayek's analysis was thus individualistic, yet also institutional, in that it recognized the potential for social and institutional factors to play a causal role (Cox, 1997;Ahdieh, 1997).

Supporters of neoliberal dogma as Richard Posner, an American jurist, legal theorist, and economist who is currently a judge on the United States Court of Appeals for the Seventh Circuit in Chicago and a Senior Lecturer at the University of Chicago Law School, indicates Hayek must be understood as a man of his time, battling contemporary enemies notably socialism in its various guises earning by doing so an honored place in the history of political and economic thought (Posner,2003). "The Road to Serfdom" is a book written by the Austrian-born economist and philosopher Friedrich von Hayek, between 1940–1943, in which he warned of the danger of the tyranny that inevitably results in from the governmental control of economic decision-making through central planning (Ebeling,1999). Nevertheless, it is crucial for the time being to just say that the first form of neoliberalism, classical neoliberalism, stems from classical liberalism and was chiefly created in inter-War Austria by economists, including Friedrich Hayek and Ludwig von Mises. They were concerned about the erosion of liberty by both socialist and fascist governments in Europe at that time and tried to restate the case for liberty which became the basis for neoliberalism.

Taking a societal perspective, Wolfgang Streeck verifies that the idea that capitalism and democracy may not easily go together is far from new. He is inclined to believe that economic science instructs citizens and politicians that markets are better for them than politics, and the real justice is market justice because it rewards everyone according to contribution rather than to needs redefined as rights. Economic theory to a specific degree has been accepted as a social theory, a fact that renders the former as "performative and thus reveals its essentially rhetorical nature as an instrument of social construction by persuasion" (Streeck,2011). In reality though, as long as there is democracy, he thinks that people insist on the primacy of the social over the economic; on social commitments and obligations being protected from market pressures for "flexibility"; and on society honoring human expectations of a life outside of the dictatorship of ever fluctuating market signals (Streeck,2011).He continues saying that people stubbornly refuse to give up on the idea of a moral economy¹² under which

¹¹ Social justice generally refers to the idea of creating a society or institution that is based on the principles of equality and solidarity, that understands and values human rights, and that recognizes the dignity of every human being.

¹² A moral economy, in one interpretation, is an economy that is based on goodness, fairness, and justice. Such an economy is generally only stable in small, closely knit communities, where the principles of mutuality — i.e. "I'll scratch your back if you'll scratch mine" — operate to avoid the free rider problem. Where economic transactions arise between strangers who cannot be informally sanctioned by a social network, the free rider problem lacks a

they have rights as people or as citizens that take precedence over the outcomes of market exchanges (Scott, 1976).

The notion of conflict between rivaling principles of allocation in a market economy according to Streeck can be explained only “by a pathetic economic education of citizens”, or” by demagoguery on the part of irresponsible politicians”. Economic dysfunctions such as inflation, public deficits and excessive private or public debt result from either limited knowledge of economic laws that are responsible for the well-function of the economy as a wealth creation machine, or from a frivolous disregard of such laws in the selfish, irresponsible pursuit of political power (Streeck,2011). Wolfgang Streeck makes also a clear distinction between those who take political economy seriously and those who don’t. For those able to conceive such theories their identification lies either in the recognition of market allocation as a political regime among others, one that is governed by the special interests of those owning scarce productive resources that put them in a strong market position while its alternative, political allocation, is preferred by those with little economic but potentially high political power (Streeck,2011). “From this perspective, standard economics is basically the theoretical exaltation of a political-economic social order that serves the interests of those well-endowed with market power, in that it equates their interests with the general interest and represents the distributional claims of the owners of productive capital as technical imperatives of good, in the sense of scientifically sound, economic management”. This argument on behalf of Wolfgang Streeck explains the gap between increasing income inequalities between rich and poor as the latter incapable of conceiving systemic relationships will always watch themselves governed by political figures not necessarily interested in social well-being.

Nowadays, political economy literature, to the extent that it comes out of mainstream economics, is obsessed with the figure of the myopic and opportunistic, in any event irresponsible, politician who address to uneducated electorate by fiddling with otherwise efficient markets and thus preventing them from achieving equilibrium-all in pursuit of objectives, such as full employment and social justice, that truly free markets would in the long run deliver anyway but must fail to deliver when distorted by politics(Streeck,2011). Governments under democratic capitalism struggle to reconcile markets demands and democratic claims for protection and redistribution of wealth. While the failure of first attempt of compensation to the owner of productive resources cause economic dysfunctions and distortions that will be increasingly unsustainable and will thereby also undermine political support, failure to attend democratic claims risk losing their majority and therefore collapse (Streeck,2011). In other words whatever is far from neoliberal is bound to fail while for those who compromise in excess level, social benefits, there will be a strong hit in their reputation and in worst scenarios that cause failure in elections or collapse of legitimacy. A striking example is Dutch government, one of the biggest critics of European countries failing to rein in their budgets, has resigned after disagreeing on a plan to bring its own deficit in line with EU rules. The Netherlands has been a key ally of Germany and one of

solution and a moral economy becomes harder to maintain. Economist John P. Powelson relate the concept of a "moral economy" to the balance of economic power; in their view, a moral economy is an economy in which economic factors are balanced against ethical norms in the name of social justice.

the most vociferous supporters of austerity since Greece's debt problems sparked the euro zone's debt crisis more than two years ago. But Greek economy is forecast to shrink this year, widening its budget deficit and making it one of the worst-performing in the euro zone. This will be a lesson to remember. Few months ago, Fitch Ratings threatened to strip the Netherlands of its cherished triple-A credit rating if it failed to take action to cut its budget deficit and stop its debt from rising. Regarding Greeks, they have never been asked whether they wish to be rescued, or at least to be rescued in such a way: in exchange for labor rights; wage and pension cuts to levels of poverty; civil sector lay-offs; fire-sale privatization of state assets; the destruction of the welfare state. Instead, an unelected government under the orders of "Troika" consisting of the European Commission (EC), the International Monetary Fund (IMF), and the European Central Bank (ECB) has been taking decisions on their behalf. In response Greek voted against austerity by voting in favor of the anti-bailout Left Coalition leading by Alexis Tsipras as happened in France where voters booted out Nicolas Sarkozy, one of the architects of European austerity, and replaced him with socialist Francois Hollande who backs Greece but urges credible reform, one that has to be blamed for the Welfare State collapse.

Social unrest is expected to grow in Europe as governments impose steep welfare cuts and fail to implement policies to reduce unemployment, according to a report by the International Labour Organisation (ILO). In the ILO's annual report on global labour conditions released on April 2012, the UN agency predicts that European social unrest will heighten this year as governments continue to forge ahead with ill-advised austerity policies. It also forecasts that over 202 million people worldwide will be unemployed in 2012. However, austerity measures have not helped European countries. Spain, for example, decreased its budget deficit by 0.5 percentage points from 2010 to 2011, yet unemployment has soared since then. In fact, Spain has the highest unemployment rate in the EU. Greece is an example of a failing experiment. Austerity measures have been imposed so that Greece could obtain €130 billion from the International Monetary Fund so to avoid defaulting. Be that as it may, Greek unemployment level is second highest in the EU leading Greek middle class to a tremendous loss in terms of real wages, jobs and standard of living during the current crisis. Their incomes dropped dramatically and their jobs disappeared. As a result, suicide rates doubled to 5.6 per 100,000 persons a year, among which most are committed by men, whereas women are seen to suffer depression. This does not seem to make sense after all since the neoliberal era began with Anglo-American casting aside political orthodoxy of postwar democratic capitalism with the reasoning that inflation was always preferable to unemployment as unemployment would be certain to undermine political support, not just for the government of the day but also for the democratic-capitalist political economic regime (Streeck, 2011).

It was only in the end of the century as Craig Murphy observes in his work "Inequality, turmoil and democracy: Global political-economic visions at the end of the century" that many Western neoliberal governments have been replaced by "reformed" parties of the centre-left: characteristic examples of such parties include the US 'New Democrats', Blair's 'New Labour', Italy's former communist Democratic Party of the Left. They share the neoliberals' fiscal conservatism and welcome a reduced role for the state while still embracing some egalitarian goals. Yet, as the Clinton administration continued support for the WTO's 'classical' liberalism indicates, the foreign policy distance between the Third Way and

neoliberalism can be slight. The term Third Way refers to various political positions which try to reconcile right-wing and left-wing politics by advocating a varying synthesis of right-wing economic and left-wing social policies (Bobbio and Cameron,1997). Third Way was created as a serious re-evaluation of political policies within various centre-left progressive movements in response to the ramifications of the collapse of international belief in the economic viability of the state economic interventionist policies that had previously been popularized by Keynesianism. International groups that supports the Third Way, include the IMD and the World Bank, with the aim to provide “realistic” programmes for improving global welfare, even though they may involve years and in some cases decades of deprivation and growing inequality in the South (Murphy,1999). Social reform in the context of Keynesian Welfare State was administered by Gary Teeple. For him the failure of reform is attributed to the fact that social democracy was dedicated to accommodating itself to capitalism rather than seeking to replace it. He also argues that this is the reason for the ultimate failure of reformist socialist and social democratic political parties which to a specific extent, have already adopted neoliberal policy approaches (Teeple,1995).

The current crisis can be described by enormous national public debt that undid whatever fiscal consolidation might have been achieved in the preceding decade. Political power was deployed so as to make future resources available for securing present social peace as well as liquidity and to reassure creditors (Streeck,2011). Wolfgang Streeck attributes this policy to a rescue plan for the financial industry’s money factories, reinstating in very short time their extraordinary profits, salaries and bonuses. Nevertheless, this plan does not prevent rising suspicions, on the part of the very same “financial markets” that had just been saved by national governments from the consequences of their own indiscretion. Even with the global economic crisis far from over, creditors began to demand a return to sound money through fiscal austerity, in search for reassurance that their vastly increased investment in government debt will not be lost (Streeck,2011). As a result the economic environment that accompanies this crisis is becoming more and more uncertain.

In fact, given the amount of debt carried by most states today, even small increases in the rate of interest on government bonds could cause fiscal disaster while simultaneously markets must avoid states declaring sovereign bankruptcy, which states always can do if market pressures become too strong (Streeck,2011). This contagious relationship demands the existence of other states which are willing to bail out those at most risk in an effort to protect themselves from a general increase in interests rates on government bonds once the first state has defaulted (Streeck,2011). A well measured phenomenon which highlights an already complicating international environment between states and competing markets where information seems to be a vital tool. Ian Bremmer and Nouriel Roubini in their recent publication “A G-Zero world: The New Economic Club will produce conflict, not Cooperation” state that “the expanded group of leading economies has gone from a would-be concert of nations to a cacophony of competing voice as the urgency of the financial crisis has waned and the diversity of political and economic values within the group has asserted itself”(Bremmer and Roubini,2011). The authors clearly undermine the role of a G-20 commission to drive a truly international agenda and this is reflected on the ironic title G-zero World, one in which no willing major country or bloc of countries will be able to live up with the expectations of economic development.

More specifically, US lacks the resources to continue as the primary provider of global public goods as it did during the last half of the century while Europe is working on rescue plans in saving the Eurozone (Bremmer and Roubini,2011). Japan likewise is obscured by complex political problems at home and none of emerging powers such as Brazil, China or India welcome the burdens that come with new responsibilities (Bremmer and Roubini,2011).They attribute this lack of initiatives to the absence of Washington Consensus or a future “Beijing Consensus” which is destined to fail due to the Chinese-Style state capitalism that is designed to meet China’s unique needs (Bremmer and Roubini,2011). Although, a publication bearing the signature of East-West Center claims that China’s accelerating innovation efforts have been truly impressive. Scholars as Max Weber and Douglass North have suggested that intellectual property systems had an important impact on the course of economic development and this is highly illustrated by Economist magazine view which labelled innovation as the “industrial religion of the late 20th century” (Valery,1999). Moreover, in its preamble WIPO¹³ raise questions in respect of the potential effects of different degrees and forms of patent protection on various economic and social measures. Later on the issue of patent system is thoroughly investigated in my thesis so for the time being our interest is centralized in China’s patent application derived through a state capitalistic emerging power in contrast with what Bremmer and Roubini call a G-Zero World. While the US government believes that markets should drive innovation, China’s government emphasizes the critical role of public policy in fostering indigenous innovation (Ernst,2011). Dieter Ernst concludes that US government and markets need to join forces and develop a national strategy to upgrade its own innovation system so as to cope with the challenge of China’s innovation policy from a position of strength. This finding is line with the very notion of triple Helix model that encourages the researcher to reflect on more than two possible dynamics namely markets and governance but also delegate a supportive role for Government in developments through changes in the regulatory environment, tax incentives and provision of public venture capital (Etzkowitz et al., 2007).

The inability of state intervention to influence drastically what we are commonly now refer as market failure for Roubini holds its origins to the absence of a leading figure to show the path. Robert Gilpin, Stephen Krasner, have identified the distribution of power among states as a central factor in explaining the openness and stability of the international economy. "Hegemonic stability theory"¹⁴, first espoused by Charles Kindleberger in the 1970s, focuses on the role of leading states for example, Great Britain in the nineteenth and the United States in the twentieth centuries - and on how changes in the distribution of capabilities affect the world economy (Milner,1998). Hegemonic stability theory asserts that a relatively open and stable international system is most likely when there is a single dominant or hegemonic state that firstly, has a sufficient large share of resources that it is able to provide leadership and secondly, is willing to pursue policies necessary to create and maintain a liberal economic order. What is more, the hegemon must follow policies that other major actors believe are relatively beneficial. This theory argued that the overwhelming dominance of one country was necessary for the existence of

¹³ The World Intellectual Property Organization (WIPO) is the United Nations agency dedicated to the use of intellectual property (patents, copyright, trademarks, designs, etc.) as a means of stimulating innovation and creativity.

¹⁴ The hegemonic stability theory is a “hybrid” theory that draws on the realist, liberal and historical structuralist perspectives.

an open and stable world economy and that such a hegemon served to coordinate and discipline other countries so that each could feel secure enough to open its markets and avoid beggar-thy-neighbor policies (Milner,1998). Conversely, the theory asserted that the decline of a hegemon tends to be associated with economic closure, instability, and the creation of competing regional blocs (Milner,1998). Since the US is still(decreasingly though) considered as the dominant power enriched with neoliberal ideology struggles to keep its position and thus political ideology. As Bremmer and Roubini confess “Today, the United States lacks the resources to continue as the primary provider of global public goods”. No matter the balance of powers in international level, at this point as Wolfgang Streeck forecasts “the price for stabilization is likely to be paid by those other than the owners of money, or at least of real money. First and foremost, he sets” in the eye of the hurricane” private savings, public entitlements and services and in one way or another losses due to higher taxes all being paid by average citizen for the consolidation of public finances, the bankruptcy of foreign states, rising rates of interest on the public debt and eventually necessary for another rescue of national and international banks (Streeck,2011).

What Bremmer and Roubini forget to mention and is observed by Rick Wolff is that today in US the largest banks, brokerages, and much of the rest of financial industry are leading and shaping the massive state intervention to “solve” the latest tumultuous crisis of private capitalism. In any case, the similarities between Great Depression of 1930s and current financial crisis are quite a lot and an increasing number of authors seem to agree on that¹⁵.

1.3 There and back again

Joseph Schumpeter in the first chapter notably “Marx the prophet “of his work “Capitalism, Socialism & Democracy“ declared that the chosen title which entails an analogy from the world of religion was not randomly selected. *“There is more than analogy. In one important sense, Marxism is a religion. To the believer it presents, first, a system of ultimate ends that embody the meaning of life and are absolute standards by which to judge events and actions; and, secondly, a guide to those ends which implies a plan of salvation and the indication of the evil from which mankind, or a chosen section of mankind, is to be saved. We may specify still further: Marxist socialism also belongs to that subgroup which promises paradise on this side of the grave. I believe that a formulation of these characteristics by an hierologist would give opportunities for classification and comment which might possibly lead much deeper into the sociological essence of Marxism than anything a mere economist can say.”* (Schumpeter,1942)

Under such a scope, it makes sense when Rick Wolff, well known for his work on Marxian economics wonders whether an alternative program can emerge. Can we respond to the crisis of private capitalism with a strategy that neither preserves by marginally adjusting a private nor pursues a transition to a fundamentally insecure state capitalism? For Rick Wolff what eventually went wrong back then lies in the maintenance of “ corporate board of directors” as receivers of the surplus/profits and thus with the great influence over how that surplus /profit was distributed, to whom and for what purposes. State

¹⁵ See for example The Great Recession vs. The Great Depression: Stylized Facts on Siblings that Were Given Different Foster Parents, Austrian Institute of Economic Research (WIFO), Economics: The Open-Access, Open-Assessment E-Journal, Vol. 4, 2010-18

capitalism therefore left in place boards of directors with the resources and the incentives to evade and undo the constraints imposed upon them. Indeed, those boards had the potential and eventually did end US state capitalism in a transition back to private capitalism (Wolff,2009). In the leftish debates' dilemma between reform or revolution¹⁶ he proposes "reform plus" or an additional reform for state to dislodge capitalist boards of directors from a position they have everywhere used against those reforms. Such a strategy would enlarge its pursuit of classic state capitalist reforms to include transforming enterprises, internal organizations of production and would permit to manage a challenging strategic goal, one that wants workers inside enterprises to displace their boards of directors and become their own collective boards of directors (Wolff,2009). He is inclined to believe that the anti-democratic split between a tiny minority inside the enterprise that receives and distributes the surplus/profits that are produced by the vast majority of workers is the problem to be addressed by democratizing enterprises. This involves the transformation of their internal structures in such a way to be possible for the producers of the surplus/ profits to become identical to the persons who receive and socially distribute the surplus/profits. It also incorporates a different educational role which targets job description to include participation in a collective board of directors comprised of such workers (Wolff,2009).

Private and state are different forms drawn within capitalism because in both of them the organization of production inside enterprises retains a common feature. A mass of workers generates a surplus appropriated and distributed socially by other people. In the private capitalism it is the boards of directors who are chosen by shareholders and they are accountable to them while in the state capitalism, "those other people may be accountable to both shareholders and state officials or, in extreme state forms, just to state officials – or they get absorbed into the state apparatus such that state officials become directors and shareholders disappear"(Wolff,2009). In both cases it is up to people to cope with the affairs of the society and neoliberal dogma as already presented is not a famous supporter of democracy while state capitalism evokes images of hard core state capitalistic models and a revolutionary socialist movement to create a classless, moneyless, and stateless social order structured upon common ownership of the means of production, as well as a social, political and economic ideology that aims at the establishment of this social order. This final prescription though has never managed to be established nor is entirely accepted as individualism promoted by the individual quasi-freedom of liberal or neo-liberal dogma that has prevailed for more than three decades leaves small room for such notions to be endogenously developed in modern capitalistic societies in which consumerism and pure self-interest is the sole purpose.

Unsurprisingly enough, reports from international community are quite different than what a Marxian economist can perceive as "reform plus" but might also provoke a passage to alternative quasi-democratic governments. Craig Murphy in his effort to update Cox's spectrum of world politics (Cox,1979) used a series of 1997 reports. Most specifically these reports come from the

¹⁶ See Rosa Luxemburg, Social Reform or Revolution, 1900 (revised second edition 1908), Online Version: Rosa Luxemburg Internet Archive (marxists.org) 1999 can be found at <http://www.marxists.org/archive/luxemburg/1900/reform-revolution/index.htm>

intergovernmental World Bank (WB,1997), United Nations Development Programme (UNDP,1997) and World Trade Organization (WTO,1997) and from the non-governmental International Federation of Red Cross and Red Crescent Societies (IFRC,1997), International Institute for Management Development (IMD,1997) and World Economic Forum (WEF,1997), as well as two special reports from the UN International Drug Control Programme (UNIDCP,1997) and the Carnegie Commission on Preventing Deadly Conflict. Hereby are presented the five visions of what the world is and what it can be:

- 1) the neoliberalism of the WEF and the WTO and of Ronald Reagan and Margaret Thatcher,
- 2) a 'hard' version of the Third Way liberalism associated with Bill Clinton and Tony Blair, a position shared by the World Bank and the IMD;
- 3) a softer Third Way liberalism reflected in the Carnegie Commission Report and the World Drug Report;
- 4) a global social democratic view exemplified by the UNDP's study; and
- 5) an accountable humanitarian view found in the IFRC's startling Disasters Report.

At times the reports seem to come from totally different worlds. The detailed data provided by the WTO are limited to the USA and Canada, the EU, Japan, South Korea, Taiwan, Singapore and Hong Kong while the IFRC's world is Africa, China, eastern Europe and the wind-wracked coasts of the Caribbean. Yet there are also significant similarities as Murphy observes. All of them confirm the value of democratic government, validating Boutros Boutros-Ghali's somewhat jarring 1995 observation that democracy had become a universally recognized "imperative" (Ghali,1995;Murphy,1999). In his work Graig Murphy acknowledges that Cox's method recognizes Antonio Gramsci's insight that a journal, a publishing house or a research centre can sometimes do the job of a political party (Gramsci,1957); thus the reports of the Club of Rome, the Trilateral Commission or the World Bank could be treated as the intellectual and rhetorical (persuasive) work of the different "parties" trying to reshape the social order that linked the privileged Western industrial powers with each other and with their dependencies in the Third World (Murphy,1999).

Graig Murphy is inclined to believe that even before Thatcher's victory, it was possible to forecast the coming triumph of what he calls a "neoliberal' global vision", partially due to the growing contradictions within the dominant Keynesian world-view (Murphy,1999). Back in 1999 the very same contradictions existed within the neoliberal vision, and the combination of the powerful economic interests organised under the 'hard' version of the Third Way the relative strengths of the global political analysis available to its advocates make it the likely candidate to remain the leading global vision over the coming decades. But the relative inattentiveness of hard 'Third Wayers' to ameliorating growing global inequality or coping with its conflictual and anti-democratic consequences will create political space for alternative visions of world order (Murphy,1999). In this sense the old veteran State through leftist perceptions of social organization leaves room for thought which among others has to take the form of productive criticism and finally conceptualize in real terms their eternal dream of social ownership and equal distribution of wealth.

In closing, it is worth comparing the post-Keynesian construction with the Third Way approach of U.K. Prime Minister Tony Blair. The Third Way is an alternative attempt to topple neoliberal domination of public policy according to Thomas Palley and one that seeks to articulate a humane path between the first way of laissez-faire capitalism and the second way of centrally planned state economies. In this, it has some resonance with the mixed economy approach of the 1960s, which argued for a combination of privately owned and nationalized industries (Palley,2004).

Even though the Third Way seeks to humanize the market, it is fundamentally different from a post-Keynesian perspective, in the sense that it basically accepts the major theoretical tenets of neoliberalism regarding income distribution and the stability of capitalist economies (Palley,2004). Viewed in this light, the Third Way represents an updating of the earlier market failure approach, and it also aims to counter the neoliberal government failure argument. Thus, the Third Way emphasizes how market failure can result from imperfect information (Palley,2004). Able to recognize traditional Governmental tools in shaping economy i.e taxes but following faithfully conservative perceptions of market forces Third Way emphasizes taxation and regulation as the preferred means of changing private sector behavior rather than prescribing that government take over production through nationalized industries and risk government failure. Regarding provision of essential services such as health and education which markets underprovide, the Third Way leave government to contract with the private sector for their procurement(Palley,2004).

Be that as it may, these Third Way innovations are in principle inconsistent with the post-Keynesian approach. Unlike the Third Way, post-Keynesianism rejects both the neoliberal approach to income distribution and its claims of an automatic tendency to full employment. Post-Keynesians contend that labor is not automatically paid what it is worth by an anonymous neutral market process. Rather, the pattern of income distribution is impacted by labor market institutions, and institutional interventions which are needed so as for the markets to have a tendency to favor capital over labor.

Moreover, capitalist economies are subject to fluctuations in aggregate demand, which give rise to unnecessary unemployment. Downward price and wage flexibility cannot resolve this problem as increasingly was advocated in Europe and US in fact as Thomas Palley argue, they often aggravate it (Palley,2004). This calls for monetary and fiscal policy interventions to correct the problem of deficient demand, and institutions that prevent generalized declines in prices and nominal wages are highly desirable to avoid debt deflations. These analytical differences fundamentally differentiate post-Keynesianism from the Third Way, and further explain the policy disagreements that delineate old from new Laborites in the United Kingdom and old from new Democrats in the United States (Palley,2004).

So what we can conclude from the discussion that already took place is that there are two main opposing ideologies which use specific schools of economics emerging from Universities and specify their appropriate use of tools to balance demand and supply side economics putting each time emphasis on their favorite tools of controlling markets. State capitalism is considered to be omnipresent in the political and economic arena and even presented as the next possible stage of capitalism. A mere shift towards state capitalism though may not perceived as ideal thus in the dilemma between reform and revolution,“reform plus” is preferred by Rick Woff, an evolutionist Marxian economist. As before, in

crisis moments in the past , when oscillations between forms of capitalism become possible, devotees of the existing form do their utmost to prevent a transition to the other form .Politicians, journalists, academics, and many others moved sharply to the right politically from 1975 and on (Wolff,2009). In that sense, they often lost touch with the basic ideas and vocabularies to think and articulate effective criticisms of private capitalism (McCarty et al.,2008). Companies and the political forces they fund, Democrat as well as Republican, will battle the re-imposition of regulations, taxes, and other limits on their activities. Finally, because the small left wing of the Democratic Party, the trade unions and most of the broader US left are now all organizationally weaker than at any time in the last century, they have less social influence (Wolff,2009). Recent political reality calls for government regulation in order to control furious market forces that have been overwhelming the globe for more than 30 years of Neoliberal dominance. From political economists to philosophers and from reformists to communitarians around the world all share the same idea that something has to be changed.

In this tumultuous era it is worth recalling words coming from the father of modern physics, Albert Einstein. "I am convinced there is only one way to eliminate these grave evils, namely through the establishment of a socialist economy, accompanied by an educational system which would be oriented toward social goals. In such an economy, the means of production are owned by society itself and are utilized in a planned fashion. A planned economy, which adjusts production to the needs of the community, would distribute the work to be done among all those able to work and would guarantee a livelihood to every man, woman, and child. The education of the individual, in addition to promoting his own innate abilities, would attempt to develop in him a sense of responsibility for his fellow-men in place of the glorification of power and success in our present society. Nevertheless, it is necessary to remember that a planned economy is not yet socialism. A planned economy as such may be accompanied by the complete enslavement of the individual" (Palley,2004). For Albert Einstein the real challenge back in 1949 in view of the far-reaching centralization of political and economic power was the prevention of bureaucracy to avoid becoming all powerful and overweening and how can the rights of individual be protected from a democratic counterweight to balance the bureaucracy derived from centralization. These questions have proved to be intertemporal in their nature.

1.4 Profits versus Public Health

"If an American is concerned only about his nation, he will not be concerned about the peoples of Asia, Africa, or South America. Is this not why nations engage in the madness of war without the slightest sense of penitence? Is this not why the murder of a citizen of your own nation is a crime, but the murder of citizens of another nation in war is an act of heroic virtue?"

- Martin Luther King, Jr.

To start with, I consider crucial to clarify briefly the role of International Law and its implications to democratic States. I recall words coming from Vaughan Lowe, professor of International Law, who sets the powers and international organizations under the government of International Law. Hence, while the Members States of the European Union are bound by internal EU law in their relationship with each other and organs of EU (such as European Commission), relations of other, non-member States with EU are governed by international law. This means that competence over legal issues is a matter for the EU and not for the Member States: “it is the EU that makes fishery treaties under which EU vessels fish in the waters of non-Member States and vice versa; and those treaties are governed by international law in the same way as are treaties made between two States (Lowe,2007).

Consequently, Human rights treaties and treaties providing for the protection of foreign investments limit the power of States members in their dealing both with individuals and companies. Such treaties give the right to individuals and companies to bring proceedings against a State member that has violated the treaty terms. As an extension of individuals’ right, any case can be permuted to European Court of Justice even if the case is examined in national courts under a judicial review. Generally speaking, “there is no absolute line that sets the boundaries between international and national law; and some bodies of law and legal procedures have characteristics of each (Lowe,2007).

Regarding the field of human rights, during the 20th century radical changes posed radical solutions. While classical international law was based on the assumption that it dealt with relations between States, and that each State could and should look after the interests of its own people it was only after WWII that the variety of States no longer remained indifferent to the mass slaughter of human beings no matter where those atrocities have being taken place. Universal Declaration of Human Rights, American Declaration of the Rights of Man and European Convention on Human Rights marked the inception of modern international law, a notion which has been expanding as State activity continued to grow.

Vaughan Lowe views the development of international law as incremental by that period, with the exception of two larger scale movements responding to the particular needs of the time. According to the author, the first targets certain aspects of international economy to create a comprehensive framework for international trade. Later on, the second movement was the development of international environmental law. Initially the main matters to be addressed were international payments and exchange rates but after WWII the reconstruction of international order demanded the creation of international institutions such as United Nations which salute that of the World Bank, IMF, GATT with last coming that of WTO.

GATT was first signed in 1947. The agreement was designed to provide an international forum that encouraged free trade between member states by regulating and reducing tariffs on traded goods and by providing a common mechanism for resolving trade disputes. In the Marrakesh Declaration and the Final Act, the parties of GATT agreed to submit a package of agreements to their respective governments. The package included the Agreement establishing the WTO and the agreements annexed to it (the GATT 1994, the GATS, the TRIPS agreements, etc). The agreements were signed on April 15, 1994, and went into force on January 1, 1995. After its formal establishment, the WTO has been

intimately entwined with the EC and now EU Law. The European Union, known for legal reasons as the European Communities in WTO matters, has been a WTO member since 1 January 1995. The 25 member States of the EU are WTO members in their own right. The European Commission speaks for all EU member States at almost all WTO meetings. Therefore, intensification of the interaction between the EU and the WTO can be predicted. In November 2001 the World Trade Organization's ministerial conference in Doha adopted a Declaration on the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) and Public Health. Trade-Related Aspects of Intellectual Property Rights (TRIPS) is expected to have the greatest impact on the pharmaceutical sector and access to medicines. The TRIPS Agreement has been in force since 1995 and is to date the most comprehensive multilateral agreement on intellectual property. The TRIPS Agreement introduced global minimum standards for protecting and enforcing nearly all forms of intellectual property rights (IPR), including those for patents. International conventions prior to TRIPS did not specify minimum standards for patents. At the time that negotiations began, over 40 countries in the world did not grant patent protection for pharmaceutical products. The TRIPS Agreement now requires all WTO members, with few exceptions, to adapt their laws to the minimum standards of IPR protection. In addition, the TRIPS Agreement also introduced detailed obligations for the enforcement of intellectual property rights.

"It is hard to think of many industries that have contributed as much in human welfare as the pharmaceutical industry." This statement was made not by a pharmaceutical industry chief executive officer but by two antitrust regulators, Roy Levy and Abraham Wickelgren, with the Federal Trade Commission. Be that as it may, a mere statement cannot save the day while millions are threatened by poverty and lack of fresh water let alone essential medicines¹⁷ a notion which among WTO legal documentation seems to be neglected. The WHO defines health as "a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity". "Public health" refers to all organized measures (whether public or private) to prevent disease, promote health, and prolong life of the population as a whole. Good health for all populations is an accepted international development goal and one building block for sustainable economic development, which is a goal both the World Health Organization and the World Trade Organization are working towards (WTO,2002). Empirical evidence from medical and economic literature show that new drugs have played a central role in increased longevity, enhanced quality of life, and improved labor-force participation and productivity while recent studies have attributed half of all welfare gains worldwide during the 20th century to the introduction of new medicines and technology (Becker et al.,2005;Nordhaus,2003).

Pharmaceuticals are inextricably linked to health systems in the sense that they can complement other types of health care services to reduce morbidity and mortality rates and enhance quality of life. Pharmaceutical drugs, in this case, they presented as having curative and therapeutic qualities hence, they are not considered as ordinary commodities. Access to pharmaceuticals is often a life and death

¹⁷ Drugs selected for their efficacy and safety to meet the priority health needs in a given country or region. The essential drugs concept has been the basis of WHO's drug strategy since 1975. The criteria for incorporating a drug in the WHO list of essential drugs also includes price considerations.

issue, illustrated most dramatically in sub-Saharan Africa where 77% of people infected with HIV lack access to essential AIDS medicines (UNAIDS,2006). The number of people living with HIV worldwide continued to grow in 2008, reaching an estimated 33.4 million (31.1 million–35.8 million). The total number of people living with the virus in 2008 was more than 20% higher than the number in 2000, and the prevalence was roughly threefold higher than in 1990 (UNAIDS,2009). Given its broader public health and developmental implications, access to essential medicines has become a central topic at the international policy-making level, not simply as a moral issue, but as a fundamental human rights concern (WHO,2006). Innovations in the health sciences have resulted in dramatic changes in the ability to treat disease and improve the quality of life and this is highly illustrated by increasing expenditures on pharmaceuticals which have grown faster than other major components of the health care system since the late 1990s (DiMasi et al.,2002). Eventually as the previous authors claim, the debates on rising health care costs and the development of new medical technologies have focused increasingly on the pharmaceutical industry, which is both a major participant in the health care industry and a major source of advances in health care technologies. While poverty and insufficient infrastructure are significant causes of the drug gap, so too are considerable market and public sector failures in relation to global pharmaceuticals. Key elements of TRIPS and TRIPS-plus standards and pressures are responsible for a set of difficulties that governments face in adopting policy options to access affordable medicines.

It is estimated that a third of the world's population - roughly two billion people - lack regular access to essential medicines while on the same time government budgets are seemingly not enough to satisfy the needs of Public Health. In the poorer parts of Africa and South-East Asia 50% of the population do not have such access. The Report of the Commission on Macroeconomics and Health (2001) (WHO,2001) estimates that by 2015 over 10 million deaths per year could be averted by scaling up interventions for communicable diseases, non-communicable diseases, and maternal and perinatal conditions. The majority of these interventions depend on essential medicines (Quick,2002). In short millions of people are still needlessly suffering and dying due to unavailable, unaffordable, unsafe or wrongly use of essential medicines. Potential solutions to this problem according to literature include drug financing, drug affordability, rational selection and use of medicines, effective drug regulation and efficient supply systems.

Patrice Trouiller et al. in their work “Drugs for neglected diseases: a failure of the market and a public health failure?” target the reluctance of R&D-based pharmaceutical industry to invest in the development of drugs to treat the major diseases of the poor, because return on investment is not guaranteed. For them, financial opportunities rather than global health needs guide the direction of new drug development since national and international politics support a free market-based world order. For governments, health insurers and households alike, the price of pharmaceuticals represents a substantial barrier to access. Pharmaceutical prices vary widely among countries and within countries, and differences in wholesale prices commonly vary from fivefold to tenfold. Price information for products of assured quality is deemed indispensable to achieve optimum value for money. The reasons for the lack of access to essential medicines are manifold, but in many cases the high prices of drugs are a barrier to needed treatments. Prohibitive drug prices are often the result of strong intellectual property protection. Governments especially in developing countries that attempt to lower the price of

medicines have come under pressure from industrialized countries and the multinational pharmaceutical industry (’t Hoen,2003). Furthermore, as Ellen ’t Hoen among others note that developing countries are under pressure from industrialized countries and the pharmaceutical industry to implement patent legislation that goes beyond the obligations of regular TRIPS agreement. This is often referred to as “TRIPS plus.” TRIPS plus is a non-technical term which refers to efforts to extend patent life beyond the twenty-year TRIPS minimum, to tighten patent protection, to limit compulsory licensing in ways not required by TRIPS, or to limit exceptions which facilitate prompt introduction of generics (WHO,2001). Regarding the latest, TRIPS agreement has effectively created extended barriers to market entry for generics, both through the requirement of 20-year patents, as well as its provisions on exclusive marketing rights and data protection. This has negative consequences for drug costs, given the proven impact of generic competition on price. Pharmaceutical product prices fall sharply when generic entry occurs following the expiration of patents (Scherer,2000). A study indicates that over time patents are the main reason for sustaining high drug prices; the appearance of generic competition results in prices of these drugs being much closer to the marginal production costs than to the prices chosen by brand name companies (Caves et al.,1991).

TRIPS agreement was introduced into WTO system during the Uruguay Round of negotiations largely as a result of lobbying by pharmaceutical companies (Abbot,2002). It determines, inter alia, requirements for the grant of rights; powerful modes of enforcement (national enforcement dispute settlement);and time limitations on protection of IPRs. James Harrison taking a broader perspective recognizes that the regulatory philosophy of the TRIPS agreement is very different from “traditional” trade agreements. Attachment to international trade law rules is then justified to promote trade liberalisation, and that such liberalization is welfare-enhancing and has positive impact on the protection and promotion of human rights (WTO,2004) . While TRIPS agreement places member States under extensive positive regulatory duties to enforce patent rights, the “welfare” balance required is far more difficult to ascertain than for agreements imposing merely liberalization requirements (Heiskanen,2004). Most importantly, there has to be a clear distinction between global trading rules-no longer centred around the unifying principle of trade liberalization-and rules that aim at creating an increasingly “uniform global regulatory infrastructure” as is happening under the TRIPS agreement (Heiskanen,2004). For James Harrison the shift towards regulatory philosophy is about to lead to more fundamental questions about the purpose and justice of global regulation that increases the need for external critique or the trade law rules (Harrison,2009).

The World Health Organization (WHO) was largely absent from the TRIPS negotiations, although it was obvious that placing newly-developed pharmaceuticals under universal patent protection would have an impact on public health systems globally. Yet as the implications of the new TRIPS regime began to take hold, State members of the WHO increasingly demanded that the organization begin to address the TRIPS Agreement and, at the least, provide guidance so as to meet its requirements. A small technical group within the WHO began to prepare and distribute concrete recommendations for coping with TRIPS by using the built-in flexibility to ameliorate the effects of introducing its requirements. These recommendations included, for example, authorizing parallel importation and granting compulsory licenses where appropriate. In this context, while it is true that TRIPS do offer safeguards to alleviate the

negative effects of patent protection or patent abuse, in reality it is completely unclear whether and how States can make use of these safeguards when patents more often than not present barriers to medicine access. On the other hand, there are those who would say that TRIPS balances the interests of the patent owners and the public good and real problems do not stem from law per se but from inefficient use of safeguards and mitigatory measures included in TRIPS like parallel imports, compulsory licensing and licensing against anti-trust practices and “sui generis system”. For them the agreement subsequently reached by WTO Members on 30 August 2003 in response to paragraph 6 of the Doha Declaration is seen as key to improve access to essential medicines in developing countries. Despite the affirmed flexibilities available under the Agreement on TRIPS for member states seeking to protect public health, the actual implementation of these measures to improve access to medicines remains uncertain. Vanessa Kerry and Kelley Lee noted that despite being hailed as a “watershed in international trade”, the Doha Declaration and Paragraph 6 decision have not lived up the expectations of addressing the problem of access to affordable medicines. The beginning for them has to be done by simplify the content of TRIPS, to enable actual implementation.

In the health sector, where denial of affordable access to treatment or pharmaceuticals can have life-or-death consequences, the conditions, including price, that determine access to medicines are of most profound importance, especially when it comes for the low-income segments which in developing countries seems to account for the great majority of the population. While recognizing that IPRs are not the only relevant factor, it seems clear that the way in which IPRs are established and enforced may have a significant impact on access to medicines. Therefore IPR system must strike a balance between creating incentives for innovation and consumers’ interest in the availability and access to the protected goods.

Let us now see the way in which rights are involved with IPRs through the report made by the High Commissioner on the impact of the agreement of TRIPS on human rights. The starting point for a human rights analysis of TRIPS Agreement is article 15 of the International Covenant on Economic, Social and Cultural Rights (ICESCR) and the similarly worded article 27 of the Universal Declaration on Human Rights. Moreover, article 15 of the Covenant obliges States Parties to respect, protect and fulfill people’s cultural rights and identifies a need to balance the protection of both public and private interests in intellectual property. While article 15 recognizes the right of everyone to take part in cultural life and to enjoy the benefits of scientific progress and applications, on the same time it also recognizes the right of everyone to benefit from the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he or she is the author. The scope of those articles together, bind States to design IP systems that strike a balance between promoting general public interests in accessing new knowledge and in protecting the interests of authors and inventors in such knowledge. The balance between public and private interests found under article 15 and article 27 of the Universal Declaration is the center of our interests and the point where intellectual property law emerges. Traditionally, States have awarded limited rights over new creations as a means of providing an incentive for innovation and for eventually ensuring public access to these creations. Under the scope of TRIPS Agreement States may grant patents to inventors for twenty years in return for a disclosure of the invention to the public after this period of time has been exhausted. During the period of protection

the patent holder has the right to exclude competitors from certain acts, such as making using or selling a patented product and profoundly the market advantage which might allow higher prices to be charged over the technology, depending on the particular market conditions. This can be used to recoup the research costs and could provide an incentive to continue investing. It is already understandable that a degree of compatibility between article 15 and traditional IP systems exists (Commission on Human Rights,2001). Reviewing in depth articles regarding IPRs and human rights and taking into account articles which might be relevant and should be read in conjunction with others we will be amazed by the contradiction between economic activity and human right protection. In the context of article 15, this suggests, that, whatever balance is struck between private and public interests in intellectual property, the balance should not work to the detriment of any of the other rights in the Covenant. Unfortunately, no matter which side we turn our eyes this trade-off between Health and profits is omnipresent. Given the discussion that already has taken place it is more than apparent that liberalization has exacerbated this trade-off in favoring the holders of capital most notably shareholders around the world and leading pharmaceutical companies.

Essential medicines are perhaps the most cost-effective element of public health after immunizations and key health promotion habits such as regular exercise. The 1978 Alma Ata Conference on primary health care recognized that essential drugs are vital for preventing and treating illnesses which affect millions of people throughout the world. They save lives and improve health. Several factors are responsible for drug prices paid by the end consumer, including manufacturer's prices, transport, and storage costs, import tariffs and taxes, procurement practices (Levison and Laing,2003) and dispensing (Henry and Lexchin,2002). However, a significant determinant of a manufacturer's price for a given drug lies in whether or not it is patented. To be sure, many of the drugs defined by WHO as essential medicines are off-patent and more affordable (Hohen-Kohler et al.,2008). It is also worth noting that significant health needs in developing countries require costly off-patent medicines, such as artemisinin-based antimalarial drugs tuberculosis treatment, and reserve antibiotics (Loewenson,2000;Medicins Sans Frontieres,2005). Chirac shares his concerns and warns that there is a risk today that WHO's list will come to be seen as a list of suboptimal drugs intended for the poor. Of course, WHO's list is supposed to be a model list intended to be adapted to local conditions, but this list has been adopted as such in many countries and people around the world tend to consider drugs outside the list as being non-essential. For example, by excluding, antiretrovirals from the list gives the message that they are not essential, which is hard to believe when looking at the improvement of patients benefiting from triple therapy (Chirac,2003).

An interesting point of view that is increasingly advocated among scientists is the notion of "social capital" derived from sociology. The foundations of those theories lie in the expected collective or economic benefits that stems from the preferential treatment and cooperation between individuals and groups. Although different social sciences emphasize different aspects of social capital, they tend to share the core idea "that social networks have value". The construct of social capital has recently captured the interest of researchers in social epidemiology and public health. Before 1995, the term of "social capital" has been only referenced once in the Medicine database in the form of "family social capital" and its effect on educational and occupational aspirations (Marjoribanks,1991). The current use

of social capital can be traced to the origins of classical sociology and political science while the appearance of the term as such in the mid 1990s was stimulated by Robert Putnam in his work on civic participation and its effect on local governance (Putnam,1993). Furthermore, in "Bowling Alone: America's Declining Social Capital" (Putnam,1995) Robert Putnam¹⁸ surveys the decline of "social capital" in the US since 1950. He has described the reduction in all the forms of in-person social intercourse upon which Americans used to found, educate, and enrich the fabric of their social lives. Robert Putnam believes this undermines the active civil engagement which a strong democracy requires from its citizens and he discusses ways in which Americans have disengaged from political involvement including decreased voter turnout, public meeting attendance, serving on committees and working with political parties. Putnam also cites Americans' growing distrust in their government. That was a most influential article since it propelled discussions between President Clinton and Putnam on the social fabric in US (Muntaner,2000). In fact, the World Bank sponsors a website whose interest targets the topic of social capital, where information is exchanged and issues actively debated. Nevertheless, one of the leading scholars in this field, Michael Woolcock, has argued that the concept of social capital ' . . . risks trying to explain too much with too little" (Woolcock,1998) .He continues saying that the term social capital is being ' . . . adopted indiscriminately, adapted uncritically, and applied imprecisely".

The goal of moving beyond individualistic theory and practice in public health is laudable and connections among individuals are an important and neglected research area in epidemiology and public health (Muntaner,2000). Koopman & Lynch showed how the different arrangement of connections among individuals results in very different patterns of infectious disease transmission in a population. Infectious disease transmission depends on who is connected to whom, and it is possible that other disease processes are also influenced by the pattern of connections within a population (Koopman and Lynch,1999).

Carles Muntaner, John Lynch & George Davey suggest that populations are not just unrelated heaps of individuals, whose patterns of connections can be ignored even if utterly simplistic interpretations of the pattern of connections among people may mask, not reveal determinants of population health (Muntaner et al.,2000).If this occurs, then strong links among individuals can both increase and decrease the risk of certain health outcomes. They also provide a number of examples to depict this relationship among individuals which cause a more complex intertwined environment on population. Tight connections among infants in a day-care centre may increase their risk of otitis-media. Similarly, strong friendship networks of peers can increase the risk of smoking, drinking or use of illicit drugs, while in a different situation these same sorts of links may decrease the risk of suicide. "Tight networks are established among the Mafia, neo-Nazi parties, or "semi-clandestine business organizations" such as the Trilateral Commission, the WTO or GATT increasing health risks for other members of the population" (Muntaner et al.,2000).

The consequences of how individuals and groups are connected rapidly becomes very complicated and this is more than apparent given the wide range of institutional organizations, the role of States as wealth machines, financial services expansion and last but not least politics. Thus, the concept of Social

¹⁸ His work has been praised by political leaders varied from Bill Clinton, Tony Blair to George W. Bush

capital, in its present form, can provide an adequate basis to understand how these connections may be linked to population. While, advocates of Social Capital believe that the way individuals and groups get connected to form friendship networks, neighborhoods, communities and populations can be important for public health, they also acknowledge that the concept of social capital, in its present form, cannot provide adequate basis to understand how these connections may be linked to population health. Later on, we will see how Social Capital is connected with Human Capital, a well measured notion in knowledge based economies.

Drug development is a complex, expensive and time-consuming activity, subject to stringent regulations. Today, drug development is confined almost exclusively to a consolidated and highly competitive multinational drug industry driven by profit and subject to the laws of a globalized market economy. Market forces inevitably skew the direction of drug R&D towards those diseases and patients (customers) that assure the highest financial returns (Sachs,1999). Indeed, global rules on trade and patents make medicines much more expensive for many people who need them. Pharmaceutical companies owning patents on drugs have tried to limit the extent of generic medicine production. They have convinced developed country governments to push for stronger protection for patented drugs when negotiating trade deals with poorer countries. The World Intellectual Property Organization (WIPO) is the United Nations agency dedicated to the use of intellectual property (patents, copyright, trademarks, designs, etc.) as a means of stimulating innovation and creativity. Frederick Abbott believes that the World Intellectual Property Organization (WIPO) has paid limited attention to the public health interests of its developing country member constituency (Abbot,2002). The organization has been criticized by the NGO community for appearing to promote high protection interests when recommending legislation to countries seeking assistance from it. “WIPO role in DOHA declaration was to say the worst no visible” (’t Hoen,2001). There is increasing concern among developing member states and the NGO community regarding renewed negotiations at WIPO on substantive patent law harmonization (Abbot,2002). According to Frederik Abbot there is a widely held perception that the US and EU industry interest groups will attempt to achieve in WIPO what cannot be achieved at the WTO (Abbot,2002)and there is a risk that rules will be adopted without the active support of many developing members. Everyone can understand that in this case, rules may be used as benchmarks by OECD patent offices, and effectively filter into developing country patent systems.

1.5 Towards a Knowledge-based economy

“Until Philosophers are kings, or the kings and princes of this world have the spirit and power of philosophy... cities will never cease from ill, nor the human race.”

-Plato, The Republic (Greek: Πολιτεία, Politeia, 380 BC)

Until this moment we saw how Governments interact with Markets and how knowledge coming from academics is translated into political ideology and finally into practice. Whether we speak for Marxist economists, evolutionary economists, Third Wayvers or neoliberal economists, the role of University is omnipresent and increasingly advocated among politicians, economists, sociologists and last but not least philosophers. In this sense, the widespread publication of Triple Helix features and recent trends of cooperative role for innovation between University, Government and Industry cannot go unnoticed. Neither does the contemporary political ideology of neoliberalism nor the austerity measures that people around Europe, US and the rest of the world suffer from. The role of Government in this innovation model is considered vital not only due to the Government Pushed mode that evokes but also due to the existence of Keynesian macroeconomic models which during the Great Depression spur economic development and growth.

“Few concepts introduced by evolutionary economists have been politically more successful than the metaphor of a knowledge-based economy” (Leydesdorff,2006). The European Summit of March 2000 in Lisbon was specifically held “to agree a new strategic goal for the Union in order to strengthen employment, economic reform and social cohesion as part of a knowledge-based economy” (European Commission,2000). The Knowledge based economy is the dominant post-industrial economic development paradigm that emerged in the 1980s, with an emphasis on the role of knowledge creation and distribution as the primary driver in the process of economic growth, the distribution of income, the growing importance of knowledge-based networks among firms, and the interface between government business and citizens in the advanced economies. Knowledge, as embodied in human beings, as “human capital”, and in technology, has always been central to economic development. Its relative importance has been recognized, just as that importance is growing since the OECD economies are more strongly dependent on the production, distribution and use of knowledge than ever before (OECD,1996). An OECD study published on 1996 locates the origin of the term “knowledge-based economy” from a fuller recognition of the role of knowledge and technology in economic growth.

One of the most distinctive features of the "new" theories of growth developed in recent years has been the broadening of the relevant concept of capital. “The most significant material change that underpins neoliberalism in the twenty-first century is the rise in the importance of knowledge as capital” (Olssen and Peters,2005). First and foremost, Human capital is a very broad and multifaceted concept, one that describes many different types of investment in people. Health and nutrition are certainly an important aspect of such investment, particularly in developing countries where deficiencies in these respects may severely limit the population's ability to engage in productive activities and thus in knowledge diffusion. Thus, the distribution of the essential medicines which improve health and alleviate the pain clearly

represent marginal/incremental contribution to what we consider today as Health Status. There is also strong empirical evidence that Health Status and socioeconomic situation which further facilitate production is very scenario dependent. For the scope of this paper given that we infer to Human Capital under the scope of KBE, the key aspect of Human Capital that is of interest to us has to do with knowledge and skills found in people and accumulated through schooling, training and experience that are useful in the production of goods, services and further knowledge. While traditional neoclassical models focused almost solely on the accumulation of physical capital in the form of equipment and structures, more recent contributions have attributed increasing importance to the accumulation of Human Capital and productive knowledge and to the interaction between them¹⁹. Theoretical models of Human Capital and growth which are built around the hypothesis that knowledge and skills embodied in humans, directly raise productivity and increase an economy's ability to develop and to adopt new technologies (de la Fuente and Ciccone,2002). Angel de la Fuente and Antonio Ciccone provided evidence which was consistent with the view that measures aimed at increasing the quantity and quality of the stock of Human Capital should be an important part of any growth-promoting policy package (de la Fuente andCiccone,2002).

The reports coming from their work contains a detailed survey of the macroeconomic literature on growth and Human Capital. The picture that is draw from this review is somewhat mixed but ultimately encouraging as the authors claim. They observed that academic economists have traditionally been considering educational expenditure as a key component of national investment with a substantial payoff in terms of output growth, and have often assigned to the accumulation of human capital a central role in formal models, particularly in the recent literature on endogenous growth. Recent studies that make use of improved data sets or allow for measurement error strongly suggest that investment in education does have a substantial impact on productivity growth²⁰.

Unsurprisingly enough, Angel de la Fuente and Antonio Ciccone try to correlate the notion of Human Capital with that of Social Capital that we encounter in the previous section of this thesis. As we saw earlier there are many ways to define social capital but all of them rest on the same ground that “social networks have value”. To meet the demands of their work it is sufficient as they say “to see Social Capital as the norms and social relations embedded in the social structure of a group of people that enables the group or individuals participating in it to achieve desired goals”. This definition though, misses what sometimes called “individual social capital, one that consists of (social) skills that enable an individual to reap market and non-market returns from interaction with others” (de la Fuente and Ciccone,2002). For the authors, these skills might best be perceived as a part of the individual’s human capital. They further informed us about Knack and Keefer (Knack and Keefer,1997) who examine numerous possible empirical proxies for social capital and assess their impact on economic growth at the country level. Two main relationships can be found in the center of their interest: between trust and civic norms on the one hand and economic growth on the other, and between associational activity and

¹⁹ See especially Lucas (1988), Romer (1989), Azariadis and Drazen (1990), Mankiw, Romer and Weil (1992) and Jones (1996).

²⁰ See for instance de la Fuente and Doménech (2000), Krueger and Lindhal (2001), Cohen and Soto (2001) and Bassanini and Scarpetta (2001).

growth. Their main finding is that trust and civic cooperation are associated with stronger economic performance, but that associational activity is unrelated to economic growth (Knack and Keefer,1997). This result is quite robust in their sample but it is still unclear whether it also holds in OECD countries as Helliwell and Zak and Knac have observed(Helliwell and Putnam,1999;Zak and Knack,2001). La Porta et al. found that social capital improves government performance, including the quality of the bureaucracy and the judicial system(La Porta et al., 1999) while Goldin and Katz argue that social capital affects and is affected by human capital accumulation(Guiso et al.,2000). Finally, Guiso, Sapienza and Zingales use data on Italian regions to show that social capital enhances financial development and access to credit (Guiso et al.,2000). To sum up, Angel de la Fuente and Antonio Ciccone are inclined to believe that “combining the positive effect of social capital on institutional quality and economic growth with the determinants of social capital suggests that human capital policies that reduce ex-ante inequality as well as the social distance between individuals, i.e. that increase social cohesion, are likely to improve economic performance” (de la Fuente and Ciccone,2002).

The hypothesis that human capital is a key determinant of productivity has received considerable attention in the academic literature. Labor economists have long been concerned with the impact of schooling and skills on individual wages and other labor market outcomes. George Psacharopoulos and Harry Patrinos recently came up with the conclusion that investment in education reacts in a more or less similar manner as investment in physical capital. “In advanced industrial countries, the returns to human and physical capital tend to be equated at the margin” (Psacharopoulos and Patrinos,2004). One of the most important findings of Angel de la Fuente and Antonio Ciccone 10 years before Psacharopoulos was that the source of aggregate excess returns to human capital is likely to come from its contribution to social cohesion and social capital. Their review of the literature suggested that the objective of enhancing social cohesion and building social capital does not stand in contradiction with human capital policies targeting complementarities between human capital and technology (de la Fuente,2002). An argument which has been perpetually defended in the literature by authors such as Nelson and Phelps, Griliches, Welch, Schultz and Psacharopoulos, that education is more productive the more volatile the state of technology (Nelson and Phelps,1966;Griliches,1969;Welch,1970;Schultz,1975;Psacharopoulos and Patrinos,2004). Furthermore, they found that the complementarity between early Human Capital and formal education as well as on-the-job training documented in the literature suggests that the success of such policies will depend crucially on generalizing access to early learning opportunities (de la Fuente and Ciccone,2002).

To be honest I cannot think of an alternative producing more equal early learning opportunities other than Public education and it is the econometric science that verifies such an argument. Comparison of microeconomic and macroeconomic estimates of the returns to education are potentially of great interest since discrepancies between them can alert us of the existence of externalities that drive a wedge between the private and public returns to schooling and may call for correction in the policy used (de la Fuente and Ciccone,2002). Hence, the finding that the return to education is higher at the aggregate than at the individual level may be interpreted as evidence of the existence of positive externalities that may justify public subsidies designed to raise investment in education to its socially optimal level. Conversely, the reverse finding may be interpreted as providing some support for

signaling or screening theories in which education does not necessarily increase productivity per se but may still increase wages because it serves as a signal for ability (i.e. allows employers to identify high-ability individuals) or as a credential for access to privileged jobs (de la Fuente and Ciccone,2002).

When European Union (EU) heads of state and government met at a summit in Lisbon in 2000, they set the goal of making Europe 'the most competitive and dynamic knowledge-based economy in the world'. In a knowledge-based economy, the “most effective modern economies will be those that produce the most information and knowledge, and make that information and knowledge easily accessible to the greatest number of individuals and enterprises”.

Mark Olssen and Michael Peters believe that the neoliberal project of globalization, an outcome of the Washington consensus and modeled by world policy agencies such as the IMF and World Bank, has predominated in world policy forums at the expense of alternative accounts of globalization(Olssen and Peters,2005)²¹. For them, this is an account that universalizes policies and obscures country and regional differences while it also denies the capacity of local traditions, institutions and cultural values to mediate, negotiate, reinterpret and transmute the dominant model of globalization and the emergent form of knowledge capitalism on which it is based. Even from mainstream economists, voices of criticism have been raised against this monolithic and homogenizing model of globalization (Olssen and Peters,2005).

One of the most notorious reforms in higher education has been to install relations of competition as a way of increasing productivity, accountability and control. Increased competition represents improved quality within neoliberalism. According to Noam Chomsky there has been a general assault in the last 25 years on solidarity, democracy, social welfare, and everything else that interferes with private power. One of the targets is undoubtedly the educational system. The author claims that a couple of years ago, the big investment firms, like Lehman Brothers, and so on, were sending around brochures to their clients bragging : “Look, we’ve taken over the health system; we’ve taken over the prison system; the next big target is the educational system (Chomsky,2000). A process which results in unimaginable consequences both in terms of inequalities(we have already clarified that early learning opportunities impact on Human Capital) as well as in terms of lucrative business on the backs of the average citizen. Contrary to pure neoliberal way of thinking reports coming from literature and most notably that of OECD which indicate the increasing demand for more highly skilled knowledge workers:

Governments will need more stress on upgrading human capital through promoting access to a range of skills, and especially the capacity to learn; enhancing the knowledge distribution power of the economy through collaborative networks and the diffusion of technology; and providing the enabling conditions for organisational change at the firm level to maximize the benefits of technology for productivity. (p. 7)

Joseph Stiglitz, as former Chief Economist of the World Bank, has criticized the policy decisions of the IMF as “a curious blend of ideology and bad economics”. In particular, he argues that the IMF’s structural adjustment policies, imposed on developing countries, have led to hunger and riots in many

²¹ There is a huge literature criticizing globalization and suggesting alternatives. For example, Appadurai (2001)

countries and precipitated crises that have led to greater poverty and international inequalities. Furthermore, Stiglitz identifies the new global “knowledge economy” as one of different nature from the traditional industrial economy in terms of the scarcity-defying characteristics of ideas. He suggests “movement to the knowledge economy necessitates a rethinking of economic fundamentals” due to the fact that knowledge is different from other goods in that it shares many of the properties of a global public good which implies a key role for governments in protecting intellectual property rights in a global economy marked by greater potential monopolies than those of the industrial age (Stiglitz,1999;Peters,2001;Olssen and Peters,2005).

Stiglitz, deviates more from the Washington consensus. In a series of related papers delivered in his role as Chief Economist for the World Bank he argues that knowledge is a public good because it is non-rivalrous. Hence, knowledge once discovered and made public, operates expansively to defy the normal “law” of scarcity that governs most commodity markets. Knowledge in its immaterial or conceptual forms—ideas, information, concepts, functions and abstract objects of thought—are purely non-rivalrous, that is, there is essentially zero marginal costs to adding more users. However, Mark Olssen and Michael Peters ascertain that once knowledge materially embodied or encoded as it happens during learning or applications or processes, it becomes costly in time and resources. Even though, knowledge for Stiglitz holds a non-rivalrous status, Mark Olssen and Michael Peters believe that it can also be excluded from particular users. They base this argument on the private provision of knowledge that normally requires some form of legal protection to incentivize firms to produce it. But knowledge is not an ordinary property right since some within it can we locate the very foundations of basic scientific research such as mathematical theorems that are not patentable and therefore a strong IPR regime might actually inhibit the pace of innovation. Even though knowledge is not a pure public good, there are extensive externalities (spillovers) associated with innovations and as Stiglitz notes, the full benefits of the transistor, microchip or laser did not accrue to those who contributed to those innovations.

As regards competition which is deemed as precondition for a successful KBE, Stiglitz recognizes that “knowledge gives rise to a form of increasing returns to scale, which may even undermine competition for with large network externalities, forms of monopoly knowledge capitalism(e.g Microsoft)become a possible danger at the international level” (Stiglitz,1999). Mark Olssen and Michael Peters are inclined to believe that new technologies provide greater scope for the suppression of competition and, if we accept the assumption that creativity is essential for the knowledge economy, then small enterprises may provide a better base for innovation than large bureaucracies. Stiglitz also gives some grounds for government funding of universities as competitive knowledge corporations in the knowledge economy and for government regulation of knowledge or information monopolies, especially those multinational companies that provide the so-called information infrastructure. Last but not least, a most important comment by Stiglitz gives some room for criticism of our current political and societal status. He notes that that changes in economic institutions have counterparts in the political sphere, demanding institutions of the open society such as a free press, transparent government, pluralism, checks and balances, toleration, freedom of thought and open public debate. This political openness is crucial for a successful transformation towards a knowledge economy and someone could logically argue that the

political openness most of the times is considered dangerous for politicians whose main goal is to remain in power and this is the main reason why implicit politics are employed.

Contemporary social and political theory is skeptical of the future of welfare states in the face of increasing global markets since their moral claims, especially during the last decades have been challenged by the neo-liberal association of market capitalism and individual freedom. To go one step beyond of markets and neoliberal dogma we have to be aware of Knowledge Capitalism and its merits. Allan Burton-Jones argues that Knowledge Capitalism probes the surface of contemporary economic and social change, revealing how the shift to a knowledge-based economy is redefining firms, empowering individuals, and reshaping the links between learning and work (Burton-Jones,1999). The author argues that industrial-era models of firm-market boundaries, work arrangements, and ownership and control are inhibiting firms' and individuals' success in the emerging knowledge economy. He also believes that the distinctions between managers and workers, learning and working, are becoming blurred so that we all become owners of our own intellectual capital, all knowledge capitalists—at least in the western advanced economies²²(Burton-Jones,1999;Olssen and Peters,2005). Moreover, even though he recognizes the supportive role of governments for a successful passage to knowledge- economy, most of the research and innovation policies occur as a response to the demands of the markets rather than state intervention. In his effort to map the shift to the knowledge economy, he distinguishes new models of knowledge centred organization, the imperatives of knowledge supply (as opposed to labour supply), the decline in traditional forms of employment and the knowledge characteristics of work. Generally, we are able to recognize five regional models, partially, based on different cultural understandings of knowledge and learning, and they represent cultural differences over the meaning and value of knowledge but also they provide a major index for regional differences in education policy (Burton-jones,1999). Those are the Anglo-American capitalism, European social market capitalism, French state capitalism and the Japanese model. One might also locate an emergent fifth model based on China's market socialism. A recent World Bank study, for instance, has suggested that the Chinese government must take on the new role of architect of appropriate institutions and provider of incentives to promote and regulate a new socialist market economy based on knowledge (Dahlman and Aubert,2001).

Mark Olssen & Michael Peters pinpointed that the notion of the knowledge economy contains something of an anomaly. In this respect, for them, the massive sweep of neoliberal reforms restructuring and privatizing the state sector, national education systems remain overwhelmingly part of the public sector, both state-owned and state-controlled even despite the recent wave of reforms in education emphasizing choice and diversity through forms of privatization or joint public-private funding partnerships such as the Private Finance Initiative(PFI)²³. Paradoxically, looking back in the past when

²²See at 192 and 194

²³ The private finance initiative (PFI) is a way of creating "public-private partnerships" (PPPs) by funding public infrastructure projects with private capital. Developed initially by the Australian and United Kingdom governments, PFI and its variants have now been adopted in many countries as part of the wider neo-liberal programme of privatisation and financialisation driven by an increased need for accountability and efficiency for public spending, national governments, and international bodies such as the World Trade Organization, International Monetary Fund, and World Bank.

the interventionist state has been rolled back and when world governments have successfully eased themselves out of the market, often substituting market mechanisms for the allocation of scarce public goods and services, governments find themselves as the major owners and controllers of the means of knowledge production in the new knowledge economy. “While some economists and policy analysts have argued that there are new grounds for reappraising the role for the state in the knowledge economy, most governments have pursued policies that have followed a process of incremental and parallel privatization designed to blur the boundaries between the public and the private, learning and work” (Olssen and Peters,2005).

To sum up, during the last decade, educationalists have experienced the effects of the Hayekian revolution in the economics of knowledge and information, one which vehemently demands smaller state intervention reflecting what we often call “attack on big government”. In the age of knowledge capitalism, we can expect governments in the West to further ease themselves out of the public provision of education as big scale privatizations, reduction of state provision as well as funding and regulation captures the head titles of newspapers. So, one can’t help but wonder whether the increasing income inequalities which further expand the socioeconomic differences among people will be the major factor of a revolutionary political economy or just a natural evolution of society, mature enough to give up from the pure individualistic approach and quasi freedom that modern democratic States provides to their societies and finally leave some room for a scientific Socialism, one that Marx dreamed of.

2. From Triple Helix(TH) model to Tetraktys model

2.1 Getting know the Triple Helix model of Innovation

The Triple Helix thesis emerged from an interaction between Etzkowitz’ longer-term interest in the study of university-industry relations and Leydesdorff’s interest in an evolutionary model that can generate a next-order hyper-cycle—or in terms of the TH, an overlay of communications (Leydesdorff,2012).Etzkowitz & Leydesdorff further elaborated the Triple Helix of University-Industry-Government Relations (Lowe,1982;Etzkowitz and Leydesdorff,2000) into a model for studying knowledge-based economies. The Triple Helix concept has also been used, in various countries, as an operational strategy for regional development and to further the knowledge-based economy. Whether in Sweden (Jacob,2006), Ethiopia (Saad et al.,2008) or Brazil (Almeida,2005) the notion of Triple Helix became a “movement” for generating incubators in the university context (Almeida,2005).

The TH denotes the university-industry-government relationship as one of relatively equal, yet interdependent, institutional spheres which overlap and take the role of the other. Bilateral relations between government and university, academia and industry and government and industry have expanded into triadic relationships among the spheres, especially at the regional level. Academic-industry-government relations are emerging from different institutional starting points in various parts of the world, but for the common purpose of stimulating knowledge-based economic development (Etzkowitz,2006). The TH entails a more prominent economic role for the university and presumes organizational innovation through hybridization. Elements from university, industry and government

were recombined to invent and then re-invent the venture capital firm, science park and university technology transfer (Almeida,2005). Such transition is considered to be difficult according to Etzkowitz but given the economic recession which plague the lives of millions by increasing unemployment rate in several countries in Europe to historic levels is considered also vital. Even though the TH model is well measured and observed around the world , the level of acceptance and development differs substantially. So while at Stanford and MIT, scientists saw the potential of academic intellectual property and spin-offs (Etzkowitz,2006), counterparts at University of Pennsylvania administrators failed. “Cooperation with traditional manufacturing industry may have blind-sided them to the opportunities arising from computer discoveries made at the university during the second World War but when Silicon Valley and Route 128 became apparent, the University of Pennsylvania built “science central” with federal urban renewal funds but only realized a partial version of the model because of over-emphasis on property development” (O’Mara,2005).

A ternary relation is expanding in an effort to describe regional and national innovation is now deemed as having a global application. As we already have seen when oscillations between forms of capitalism become possible, devotees of the existing form do their utmost to prevent a transition to the other form. In this respect, KBE can prove to be a merely private capitalist status, one that will accept uncritically neoliberal dogma of laissez faire. Systemic nature of university-industry-government relations, can be explained using the triple Helix model instead of assuming the existence of national (or regional) systems of innovations on a priori grounds (Leydesdorff,2011).

The triple helix model of innovation, with converging institutional spheres of academia, industry and government each taking the role of the other has been read in different ways in various parts of the world according to the type of model that is implemented. Thus, in countries where the interface is well underway, whether occurring from the bottom up, through the interactions of individuals and organizations from different institutional spheres, or top down, encouraged by policy measures, the triple helix can be recognized as an empirical phenomenon. Top down and bottom up type of Tripe Helix reflect different hierarchal levels of innovation. While top down indicates that the process was initiated high in the hierarchy for example ministers while bottom up indicates the process was initiated lower down in the hierarchy for example by public employees(in case of public sector) or by mid-level policy makers. Paul Windrum and Per Koch noted that top down innovations tend to be initiated with changes in governance frameworks and regulation with the aim to achieve greater efficiency in the supply of existing services. On the other hand bottom up innovations may be focuses on an expansion of the quality of supplied services or the development of new service (Windrum and Koch,2008). Since the scope of this thesis does not involve the analysis of the two notions I will not expand further to the top down or bottom up innovation. This paragraph was used in order to clarify briefly these two different approaches to innovation policy and introduce them in Tetraktys model of innovation since both approaches, top-down and button-up, are captured in this expanded model.

Triple Helix in the form of a spiral (versus traditional linear)model of innovation that captures multiple reciprocal relationships among institutional settings namely, public, private and academic at different stages in the capitalisation of knowledge. These three institutional spheres which formerly operated at arms' length in liberal capitalist societies are increasingly working together, with a spiral pattern of

linkages emerging at various stages of the innovation process, to form the "Triple Helix." The TH model, introduced in the studies of innovation economy could be considered a useful analysis tool for the study of European regional socio-economic systems. Riccardo Viale and Beatrice Ghiglione argued that this model results in by the final convergence of these three worlds could be represented by three levels: the actors, the institutions and the laws and regulations (Viale and Ghiglione,1998). They divided those three worlds into micro,meso and macro level. The once separating worlds are now converging resulting in different mix and complexity of relations.

The“micro”level where the real source of knowledge stems from, including the actors who show roles and action models and consists of various and varied cultures within academia, government and enterprise. This level includes:

- Academic researchers become small private entrepreneurs of their own technologies.
- Private entrepreneurs work in a laboratory or in a University technology transfer office.
- Academic and industrial researchers are encharged of the management of a government project or of a regional agency of technology transfer.
- Public researchers go to work in a company.

The “meso”level referes to institutions and more specifically to the organisational production and use of technological knowledge. Moreover, they divided the number of institutions into three subcategories:

- The “hybrid agents of innovation”, such as university spin-offs in the field of hi-tech enterprises, or venture capital societies set up by universities. They are directly encharged of the production and use of knowledge and are hybrid forms of interaction between university, enterprise and government.
- The “innovation interfaces” between enterprise and research.
- Finally, the”innovation coordinators” encharged of coordination and management of the various phases of the innovation activity.

Between 2 and 3 are to be found all those institutions which support the traditional research institutions, such as regional technology transfer agencies. Their aim is to organise with a top-down approach the interactions between enterprise and public research, dissemination of technological know-how in the region, etc.

This “macro” level is crucial in order to set guidelines for policy incentives: the actor will take decisions according to the normative framework and to the financial incentives already on the ground. Additional to the traditional S&T policy tools such as the legislation on property rights and on autonomy of universities, some effective tools have been experimented in the US market:

- laws supporting “venture capital activities” for hi-tech enterprises.
- NASDAQ , a Stock Exchange for high-tech enterprises (Viale and Ghiglione,1998).

In the Triple Helix model of the knowledge-based economy, the main institutions have first been defined as university, industry, and government (Etzkowitz and Leydesdorff,1995). However, Loet Leydesdorff supports these institutional carriers of an innovation system can be expected to entertain a dually layered network: one layer of institutional relations in which they constrain each other's behavior, and another layer of functional relations in which they shape each other's expectations (Leydesdorff,2006). "The institutional relations provide us with network data, but the functions in a knowledge-based economy are to be analyzed in terms of the transformative dynamics. The knowledge base of an economy can be considered as a specific configuration in the structure of expectations which feeds back as a transformation mechanism on the institutional arrangements" (Leydesdorff,2006). But how would a knowledge-based economy operate differently from a market-based or political economy?

According to Loet Leydesdorff the market mechanism first equilibrates between supply and demand and then economic exchange relations can be regulated by political institutions (Leydesdorff,2006). He argues that organized knowledge production has more recently added a third coordination mechanism to the social system in addition to economic exchange relations and political control (Gibbons et al.,1994;Schumpeter,1939,1964;Whitley,1984).

Three sub-dynamics are reproduced as functions of a knowledge-based economy according to Leydesdorff: To begin with, it is wealth generation in the economy. Secondly, novelty generation by organized science and technology. Thirdly, governance of the interactions among these two subdynamics by policy-making in the public sphere and management in the private sphere. The economic system, the academic system and the political system can be considered as relatively autonomous subsystems of society which operate with different mechanisms. However, in order to describe their mutual interdependence and interaction with respect to knowledge creation, one first needs to distinguish these mechanisms.

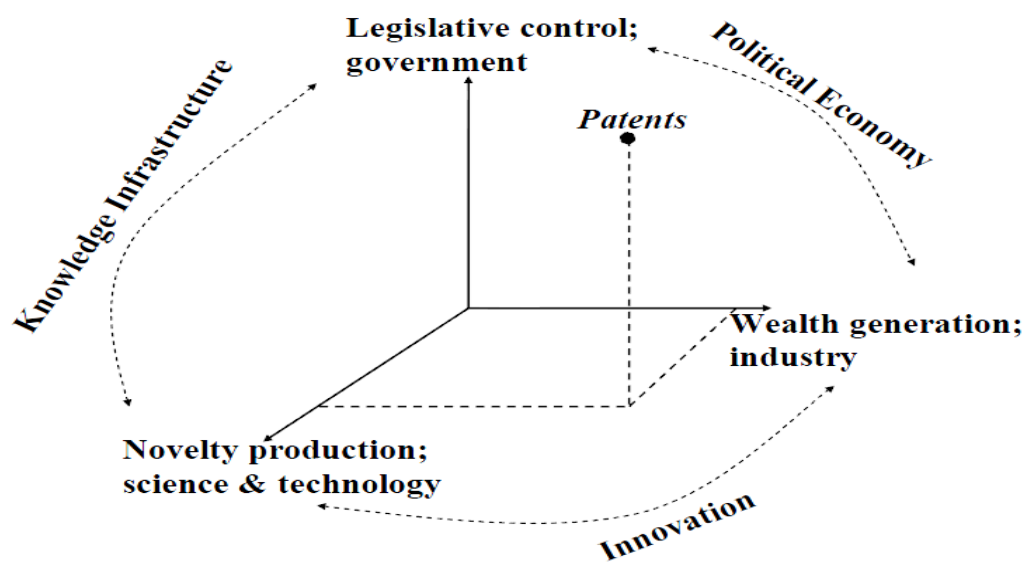


Figure 1: Patents as events in the three-dimensional space of Triple Helix interactions. Source: Loet Leydesdorff, *The Knowledge-Based Economy and the Triple Helix Model*, 2006

The three sub-dynamics are not given, but constructed and continuously reconstructed in social relations. They can be considered as three helices operating upon each other selectively. In figure 1 we can see that a patent can be considered as an event in which the coordination mechanisms interact. The interactions among these functionally differentiated mechanisms drive a cultural evolution which requires a model more complex than the biological model of evolution (Luhmann,1984,1990,1995).

Leydesdorff states that biological evolution assumes “natural selection” as a single selection mechanism. When selecting recursively from each other, two selection mechanisms can be expected to develop into a co-evolution as happens in a process of “mutual shaping”. But the dynamics among three selection mechanisms, however, can be expected to lead to a higher degree of non-linearity and therefore complexity (Li and Yorke,1975;May and Leonard,1975;May,1976). The resulting complex dynamics evolves in terms of trajectories and regimes that change the system in which they emerge (Dosi,1982).

In the figure 1 we can also see how patents are positioned in terms of the three social coordination mechanisms of (1) wealth generation on the market by industry, (2) legislative control by government, and (3) novelty production in academia. While patents are output indicators for science and technology, they also function as input into the economy. Their main function (at least up to date), however, is to provide legal protection for intellectual property. In other words, events in a knowledge based economy can be positioned in this three-dimensional space of industry, government, and academia. When events (e.g., patents) can also circulate, a three-way interaction can be expected. This knowledge-based economy contributes to the political economy by ensuring that the social organization of knowledge as R&D is developed internally into the systems dynamics (Leydesdorff,2012).

A key understanding of how IPR ownership enhances or inhibits innovation is important. Where researchers and universities have little or no share in intellectual property, a major driver for innovation

is absent. The Bayh-Dole Act²⁴ of 1980 created a “partial teachers exemption”, guaranteeing academic inventors a significant share of proceeds, while placing ownership in the university to encourage organizational efforts to facilitate transfer and encouraging academic entrepreneurship. Be that as it may, an influential study undertaken by Henderson et al., which examined the impact of Bayh–Dole on the quality of university patents, as measured by the number of times they are cited in subsequent patents, showed that the quality of academic patents declined dramatically after Bayh–Dole (Henderson et al.,1998). Yet another study by Sampat et al. analyzing the results coming from Henderson et al. study found that the quality decline observed reflects truncation of the citations data as well as some change in the intertemporal distribution of citations to university patents (Sampata et al.,2003).

The current patent system will be examined in detail in other chapter but for now we could simply conclude that the final outcome of the interacting sums depends on wealth generation capabilities of industries , novelty production and legislative power which all together interact to achieve a particular innovation capability determined by industry efficiency that coexists with a country-specific political economy at national level. I would dare to conclude also that, the international level decisively influence the national level and that foreign relations are shaped within such a process.Finally, few words have to be said about the push modes of this innovation model. The literature review locates three main push modes which can spur development and innovation capability on the grounds of TH.

2.2 Triple Helix configurations

According to Etzkowitz a typology of innovation systems incorporates various national perspectives. First, it is the Triple Helix I-or Government pushed TH- which is considered to be a static triple helix in which the state encompasses academia and industry and determines the relations between them. Secondly, Triple Helix II, a laissez-faire pushed TH, consists of separate institutional spheres, where government, university and industry operate apart from each other. In the second model university provides basic research and trained persons while industrial firms should operate completely apart from each other in competitive relationships linked through the markets. In that case, the role of the government is more or less limited(strictly most of the times) to address market failures given that private sector is incapable or unwilling to support. Finally, the Triple Helix III-University pushed TH, one in which the three overlapping institutional spheres, yet relatively independent, interact with each other²⁵. The final model is considered to be omnipresent in most developed and developing countries and regions which are trying to attain some form of Triple Helix III, with university spin-off firms,

²⁴ The Bayh-Dole Act allows for the transfer of exclusive control over many government funded inventions to universities and businesses operating with federal contracts for the purpose of further development and commercialization. The contracting universities and businesses are then permitted to exclusively license the inventions to other parties. The federal government, however, retains "March-in" rights to license the invention to a third party, without the consent of the patent holder or original licensee, where it determines the invention is not being made available to the public on a reasonable basis

²⁵Henry Etzkowitz, James Dzisah, Marina Ranga and Chunyan Zhou ,The triple helix model of innovation, University-industry-government interaction, Triple Helix VI, “The Entrepreneurial University” organized by the Entrepreneurship Centre of the National University of Singapore, May 2007, is the first to be held in Asia. Please check www.triplehelix65.com for further information.

trilateral initiatives for knowledge-based economic development and strategic alliances among firms, government laboratories and academic research groups (Etzkowitz et al.,2007). Academia plays the role of source of information and regional development apart from its traditional role to train working labor and producer of knowledge. Government supports new developments through regulatory environment, tax incentives and provision of public venture capital while industry is responsible for the production of goods as well as the training and research often at the same high level as universities. The final outcome seems to depend on the overlapping capability of each institutional sphere and the result of the events or arrangements (incentivized and not controlled by government which confront with “rules of the game” and provide direct or indirect financial assistance) that takes place among them. It is high time for us to have a brief review of the main features and characteristics of the push modes that TH model evokes.

Government Pushed TH-mode II

This configuration is based on State that encompasses academia and industry and directs the relations between them. A strong version can be found in the former Soviet Union and eastern countries under “existing socialism” whereas weaker versions are practiced in Latin American countries and to some extent in European countries such as Norway (Etzkowitz and Leydesdorff,2000).

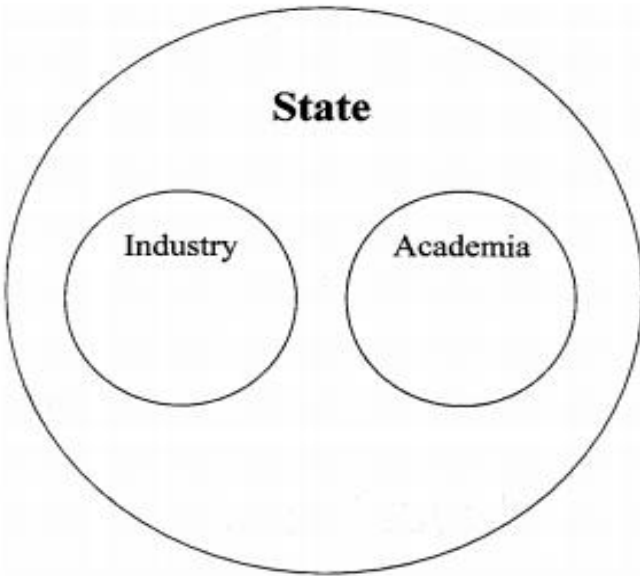


Figure 2: An etatistic model of university–industry–government

Source: Henry Etzkowitz, Loet Leydesdorff,(2000), The dynamics of innovation: from National Systems and “Mode2” to a Triple Helix of university–industry–government relations, Research Policy 29 2000 109–123

Industry Pushed TH-laissez faire

A second TH model consists of separate institutional spheres with strong borders dividing them and highly circumscribed relations among the spheres. Triple Helix II entails a laissez-faire policy, nowadays also advocated as shock therapy to reduce the role of the state in Triple Helix I (Etzkowitz and Leydesdorff, 2000).

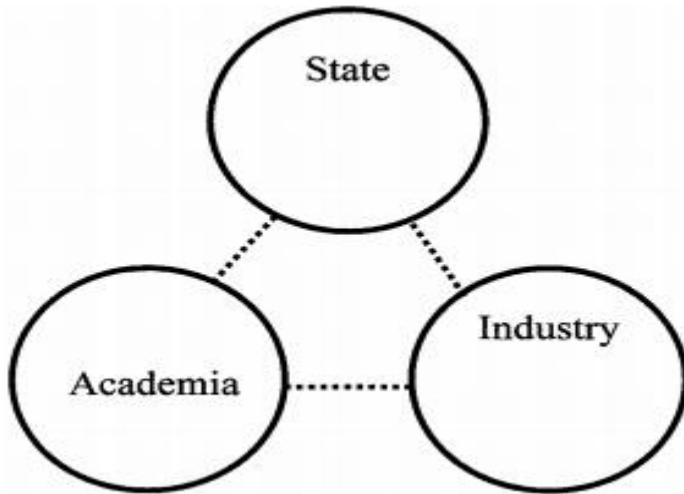


Figure 3 : A “laissez-faire” model of university–industry–government relations

Source: Henry Etzkowitz, Loet Leydesdorff, (2000), The dynamics of innovation: from National Systems and “Mode2” to a Triple Helix of university–industry–government relations, Research Policy 29 2000 109–123

Triple Helix III

Finally, Triple Helix III is generating a knowledge infrastructure in terms of overlapping institutional spheres, with each taking the role of the other and with hybrid organizations emerging at the interfaces (Etzkowitz and Leydesdorff,2000).

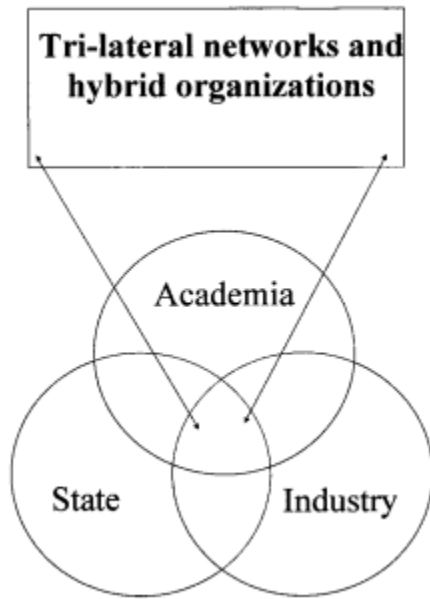


Figure 4 : The Triple Helix Model of University–Industry–Government Relations.

Source: Source: Henry Etzkowitz, Loet Leydesdorff,(2000), The dynamics of innovation: from National Systems and “Mode2” to a Triple Helix of university–industry–government relations, Research Policy 29 2000 109–123

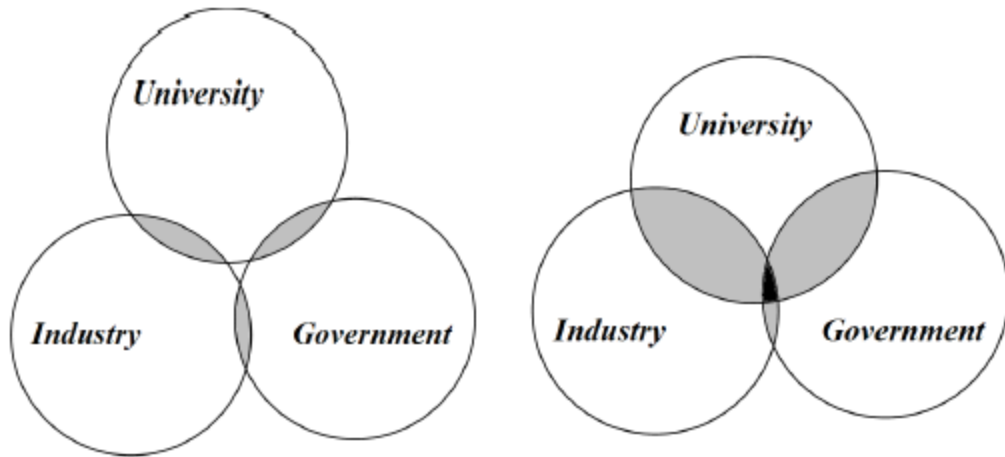


Figure 5: A Triple Helix configuration with negative and positive overlap among the three subsystems.

Source: Loet Leydesdorff,(2012), The Triple Helix of University-Industry-Government Relations

In Figure 5 we can see the Triple Helix model of university-industry-government relations as alternating between bilateral and trilateral coordination mechanisms or—in institutional terms—spheres. These systems remain in transition due to the fact that each of the partner institutes also develops its own differing mission. Therefore, a trade-off can be generated between integration and differentiation, and new systems in terms of possible synergies can be explored and potentially shaped. In figure 5 we can see that while the various bilateral translations function, a Triple Helix overlay can also be expected to develop as a system of meaning exchanges among differently coded expectations (Leydesdorff,2012).

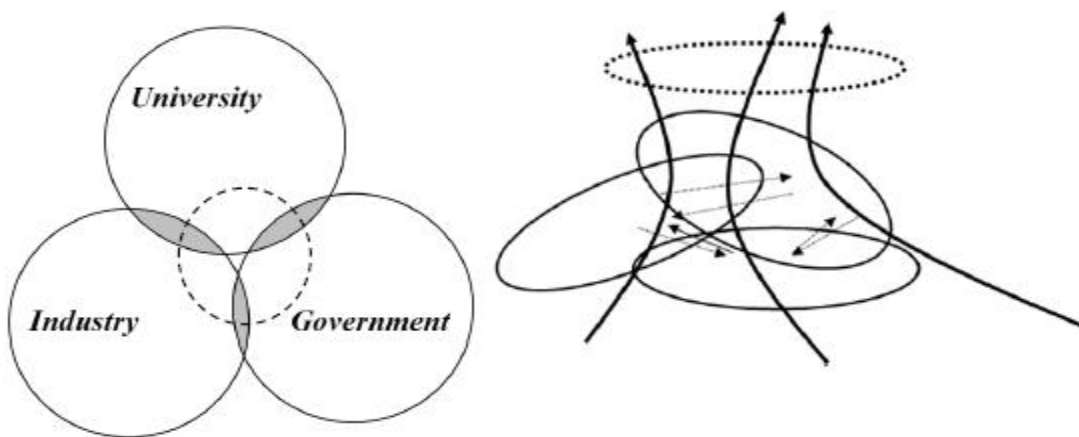


Figure 6: A differentiated Triple Helix with dynamic overlay

Source: Loet Leydesdorff,(2012), The Triple Helix of University-Industry-Government Relations

If one envisages the overlay (in Figure 6) as hovering above the sheet, one can notice an imagine of a tetrahedron emerging from the bottom with four (three plus one) different types of communications

involved (Leydesdorff,2012). Leydesdorff notes also that political, scientific, and economic exchanges are different, but these media like power, truth, and money can be exchanged (Leydesdorff,2012;Luhmann,1995). In the overlay, translations among the various media can further be invented and developed.

2.3 Tetraktys model of Innovation

“The Tetraktys pictured at right [also known as the decad] is an equilateral triangle formed from the sequence of the first ten numbers aligned in four rows. It is both a mathematical idea and a metaphysical symbol that embraces within itself — in seedlike form — the principles of the natural world, the harmony of the cosmos, the ascent to the divine, and the mysteries of the divine realm. So revered was this ancient symbol that it inspired ancient philosophers to swear by the name of the one who brought this gift to humanity”...

-Iamblichus²⁶

Pythagoras (Greek: Πυθαγόρας ὁ Σάμιος; Pythagóras ho Sámios "Pythagoras the Samian", or simply Πυθαγόρας;) was born on the island of Samos in or about 570 B.C. and was perhaps the first to call himself a “philosopher.” Pythagoreans saw a deep and mysterious patterned structure in nature. They were convinced that a great power lay in numbers.

This belief stemmed from observations in music, mathematics and astronomy. For Pythagoras the ultimate reality was abstract and relational, depending on number: the four integers 1, 2, 3, 4 were divine generating entities. The importance of pure numbers is central to the Pythagorean view of the world. A point was associated with 1, a line with 2 a surface with 3 and a solid with 4. Their sum, 10, was sacred and omnipresent. To disseminate and conceal their teachings about this, the Pythagoreans synthesized their ideas into one symbol: the sacred Tetraktys (tetraktys in Greek means “fourness”). For them it was the very expression of Divinity, the image of the created and eternal realms. The sacred integers, 1, 2, 3, 4—the Tetraktys—were the grounding, respectively, of the point, the line, the plane, and the solid, and it was with these integers that the soul of the cosmos then generates the sensible world of material things. Pythagoras’s teachings were to exert a strong influence for centuries, but markedly on Socrates, at least as Socrates is presented in the dialogues of Plato. This influence is seen in the Socratic theories that investigation of natural phenomena will always lead to the abstract, that abstractions such as number and form are capable of generating physical reality (Robinson,2004).

In the modern times through a recent publication “Mysteries of the Equilateral Triangle”, Brian McCartin, Professor of Applied Mathematics at Kettering University notes that Human beings, “being as they be”, tend to take for granted some of their greatest discoveries such as witness the wheel, fire,

²⁶ Iamblichus, also known as Iamblichus Chalcidensis, (Ancient Greek: Ἰάμβλιχος, probably from Syriac or Aramaic ya-mlku, "He is king", c. 245–c. 325) was a Syrian Neoplatonist philosopher who determined the direction taken by later Neoplatonic philosophy. He is perhaps best known for his compendium on Pythagorean philosophy.

language or music.” In Mathematics, the once flourishing topic of Triangle Geometry has turned fallow and fallen out of vogue although Phil Davis offers us hope that it may be resuscitated by the Computer” (Davis,1995;McCartin,2010). One should really wonder what Brain McCartin might mean by saying “A regrettable casualty of this general decline in prominence has been the Equilateral Triangle” (McCartin,2010).

The Pythagorean Tetraktys is shown in Figure 7a, which is derived from Robert Fludd’s *Philosophia Sacra* (1626), Fludd’s *Philosophia Sacra* (1626), where the image shows how the original absolute darkness preceded the Monad (1), the first created light; the Dyad (2) is the polarity of light (*Lux*) and darkness (*Tenebrae*), with which the Humid Spirit (*Aqua*) makes a third; the combination of the four elements (*Fire, Air, Aqua, Terra*) provides the foundation of the world (McCartin,2010). As we said earlier, for the Pythagoreans, the first row represented zero-dimensions (a point), the second row one-dimension (a line defined by two points), the third row two-dimensions (a plane defined by a triangle of three points) and the fourth row three-dimensions (a tetrahedron defined by four points). Together, they symbolized the four elements: earth, air, fire and water. The Tetraktys (four) was seen to be the sacred decad (ten) in disguise ($1+2+3+4=10$). It also embodies the four main Greek musical harmonies: the fourth (4:3), the fifth (3:2), the octave (2:1) and the double octave (4:1) (Gorman,1979).

For neopythagoreans, the Tetraktys’ three corner dots guard a hexagon(6, symbolizing life) and the hexagon circumscribes a mystic hexagram (two overlapping equilateral triangles, upward-pointing for male and downward pointing for female, denoting divine balance enclosing a lone dot(Shesso,2007) as can be seen in figure 7b. The tetraktys is also the geometric representation of the fourth of the triangular numbers $\Delta_n=n(n+1)/2$ as depicted in figure 7c.

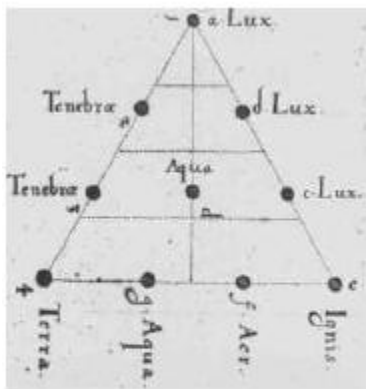


Figure 7a: Pythagorean Tetraktys

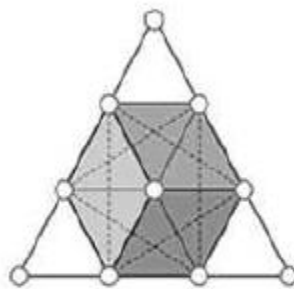


Figure 7b: Neopythagorean Tetraktys

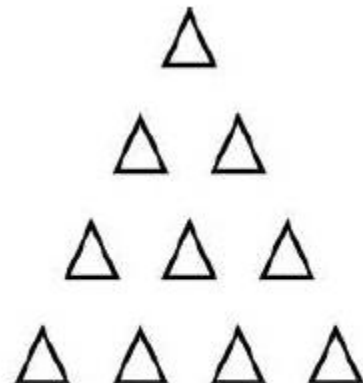


Figure 7c: Triangular Numbers

Source: Brian J. McCartin,(2010), *Mysteries of the Equilateral Triangle*.

Starting with the monaktys as the three-in- one symbol of the Trinity, which symbolises the interwoven harmony of the threefold order of the polyhedra. This also represents what Lawlor describes as the Hindu concentric cosmic model of polyhedra inscribed one inside another (Lawlor,1982), one octave

comprising Icosahedron, Dodecahedron, Cube, Positive and Negative Tetrahedra, and Octahedron through to inner Icosahedron (Meurant,1993).Secondly, it is the duaktys that comprises three quasi-regulars, each the key solid of its class: the Class I Octahedron, the Class II Cuboctahedron, and the Class III Icosidodecahedron(Meurant,1993). Thirdly, the two forms of the triaktys are derived; firstly, each quasi-regular solid is located opposite its dual. Furthermore, the same dualities locate the respective male and female polar solids of each class, with male elements without and female within (Meurant,1993).Fourthly the tetraktys locates three triplets at this level of manifestation, one for each class, of outward quasiregular and withdrawn male and female poles to either side, the three triplets being symmetrically arranged about the central three-in-one. Quasi-regulars form an outer triangle; a hexagon consists of alternating male and female poles, which comprise two male and female interpenetrating triangles, with the polar opposites of each class lying opposite each other (Meurant,1993).

2.4 Exhibition-graphical representation and function of Tetraktys

Hereby, I present to you Tetraktys(greek: Τετρακτύς)model of Innovation which stands for expanded version of triple Helix of University-Industry-Government Relations based on quadruple presentation. To fulfill the purpose of this work, I devise an expanded model which consists of three main domains presented in a triangle relationship. While triple Helix conceptualize precisely how Government, University and Industry bonds are tight with each other, Tetraktys situates Polyhedral Geometry within a traditional perspective, and allows the relevant institutional spheres to be incorporated. The polyhedral exhibit structural patterns which in a fundamental sense embody the three distinct sub-disciplines which all together constitute Political Science as such: political philosophy, Comparative politics and international relationships. The framework used for University, State and industry draws from Triple Helix model of innovation model literature review while the quadruple presentation can be based on article “The Triple Helix, Quadruple Helix, ..., and an N-Tuple of Helices: Explanatory Models for Analyzing the Knowledge-Based Economy?” published by Loet Leydesdorff.

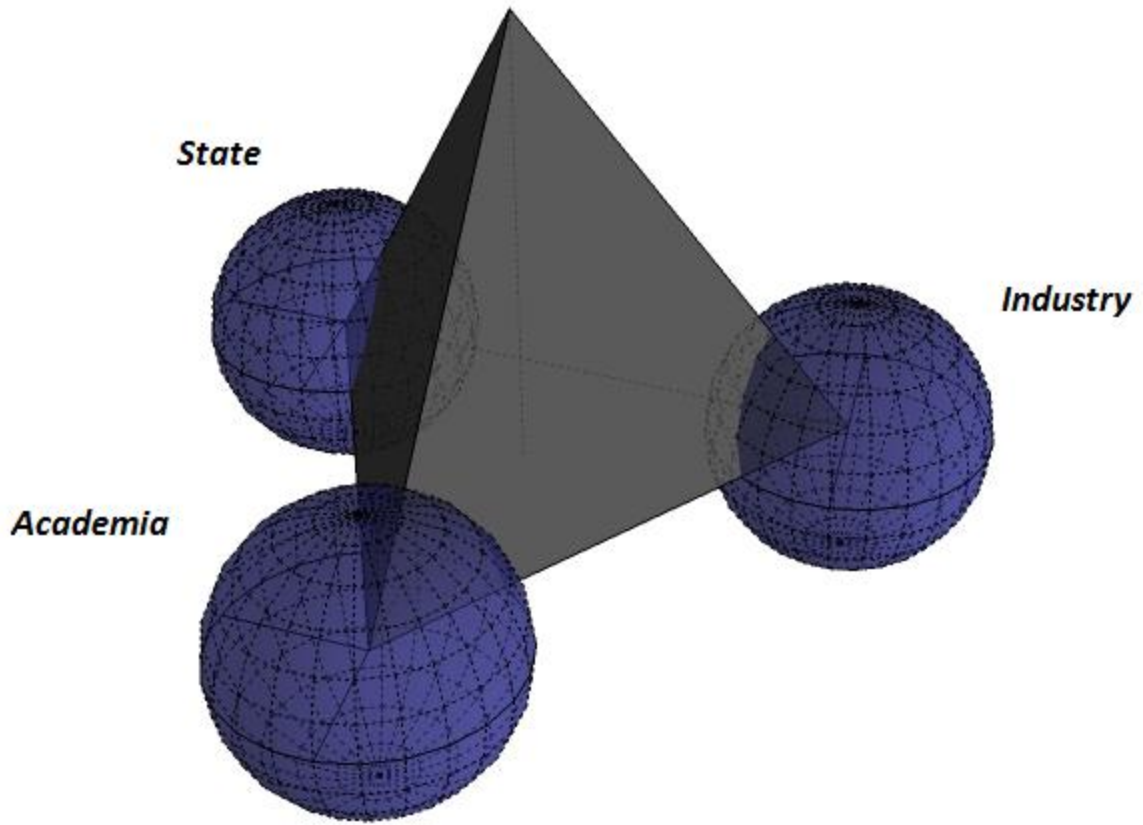
An equilateral triangle is drawn such that all three points of the triangle touch the center of the each institutional sphere with corners depicting State, Academia and Industry. These are real institutional spheres inextricably linked in the wider capitalistic mode of production (Kapitalistische Produktionsform as referred in the Das Kapital), narrowly defined for the purpose of this thesis in the case of pharmaceuticals, the production and development of new drugs. Government agencies accounts for the regulatory authority and the decision making body since Pharmaceutical markets are substantially regulated in order to promote Health goals. Government refers also in political community, acting under a political regime and is one of the three key elements in fostering Innovation. Last but not least, Government is the actor which can influence the other two in order to establish contacts and encourage participants to work with each other (Inzelt,2004). Pharmaceutical industry develops, produces and markets drugs licensed for use as medications and reflects the ownership of capital in health sector while it is considered to be the overruling source of future economic and social development. The next and probably most underestimated institutional sphere is University. According to Varga, University influences the economy of regions in two ways. The first is simply the spending effect, which works

through spending on the employees and students of the university while the second is the diffusion of knowledge (academic, technological and economic) into business sphere. In most of the developed or developing high tech regions in the US, Europe or Asia innovation is considered the result of planned and deliberate economic political interference. The direct support of the universities is increasing significantly, and regional governments spend more on various university projects (Varga,2004).Thus, the regional approach is converted into an international approach with Governments around the world playing a most crucial role in pace of innovation.

Tetraktys modeling capabilities can depict institutional spheres and not merely helices in a third dimensional projection. Bottom-up or top-down features can be shown by just turning the pyramid while the internal presentation(forming an hexagon as neopythagoreans drawing in figure (3) of Tetraktys maps a classification sequence of different possible political economies that occur. The ternary relations between University, Government and Industry can be located each time in one of the surfaces of the pyramid according to the leading institutional sphere that can be found also on the forth corner(the peak of the triangle) which further represents a push mode. Flows between institutional spheres can be presented graphically through the lines that interconnect the centers of the spheres. The model depicts the interaction between key elements and flows from one domain to the other by taking into account the rules defining private property(at least in case for laissez faire mode). National Regional or International treatment of innovation, all can be captured in Tetraktys model according to the push mode(Government, University or laissez faire) that can be implemented which consequently evokes three different modes of TH most notably known as Static(government-pushed),laissez faire(industry-pushed) and mode III, one which is considered as transactional and exhibits the interaction of the three institutional spheres with University to be the milestone.

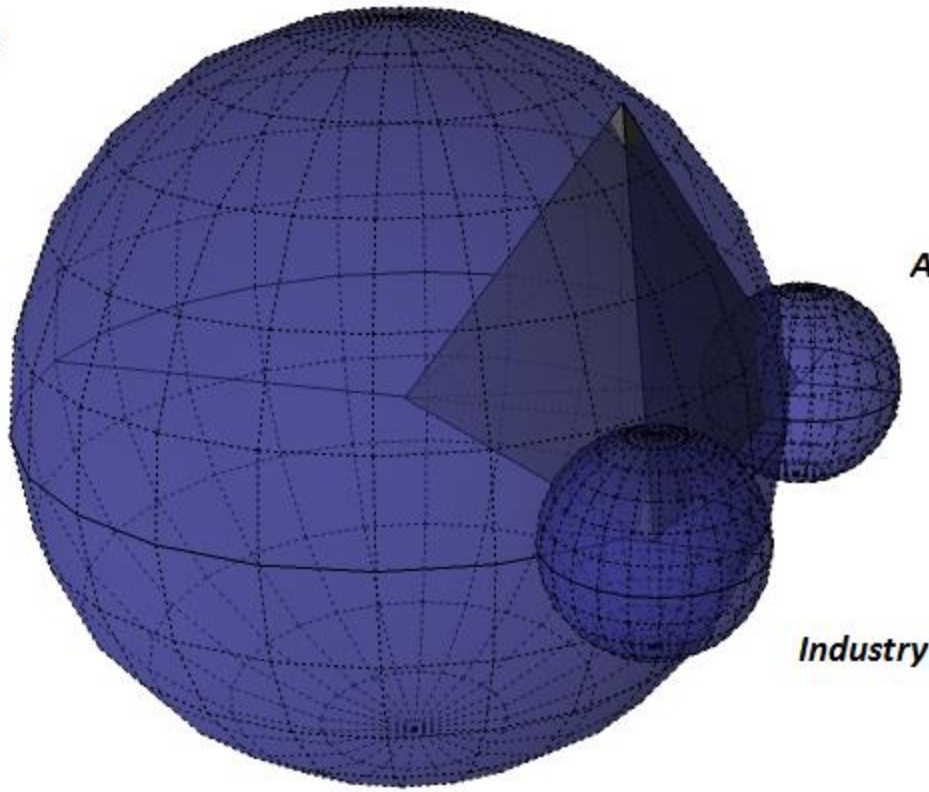
Thus, using Tetraktys model of innovation we can observe the same Triple Helix innovation patterns of Government Pushed TH-Triple Helix I, Industry Pushed TH-laissez faire as well as the interdependent institutional spheres of Triple Helix III but also the geometrical application of Tetraktys. In the next slides you can see Tetraktys configuration based on Triple Helix model depicting the solid environment and not merely helices. Tetraktys evokes also images of Capitalism, Socialism and Knowledge-based era within the concept of Triple Helix III in which the institutional sphere that overlaps the others promotes respectively a Social, Capitalist or a new political-economic and social interaction based on University superiority in shaping the others' roles in income and production distribution.

Industry Pushed TH-laissez faire



Government Pushed TH-mode II

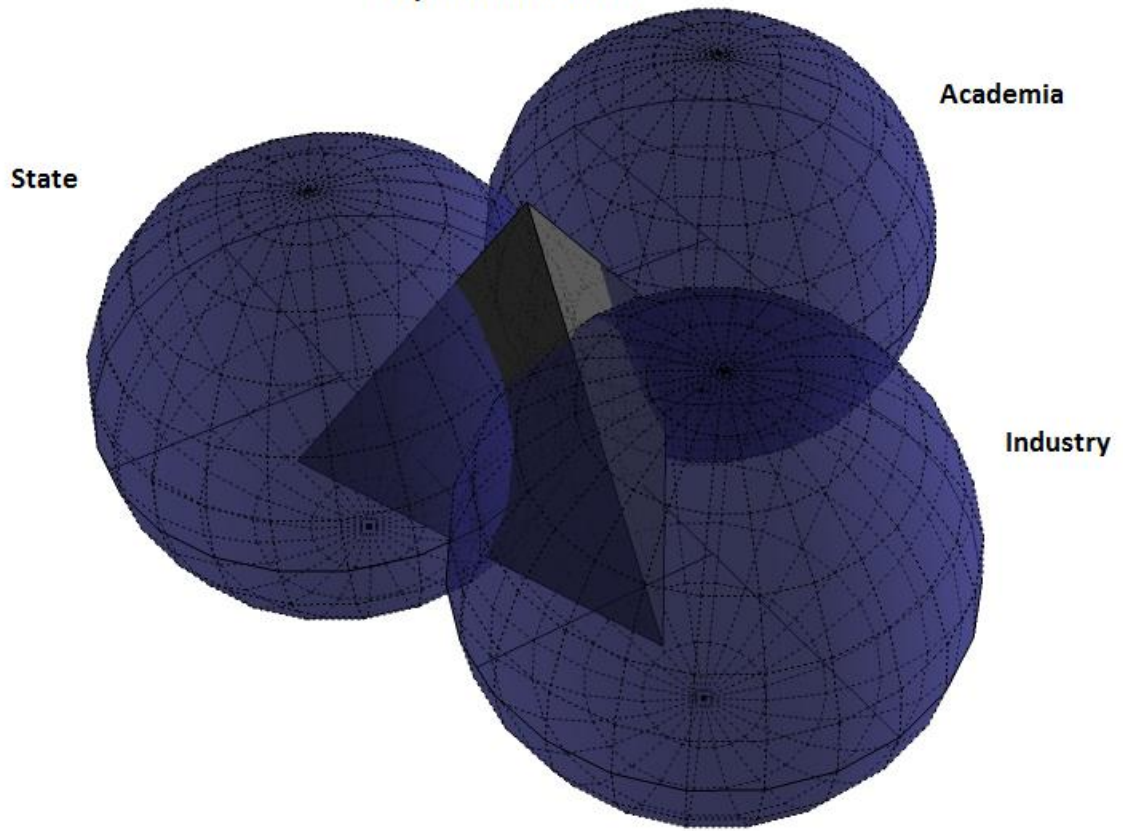
State



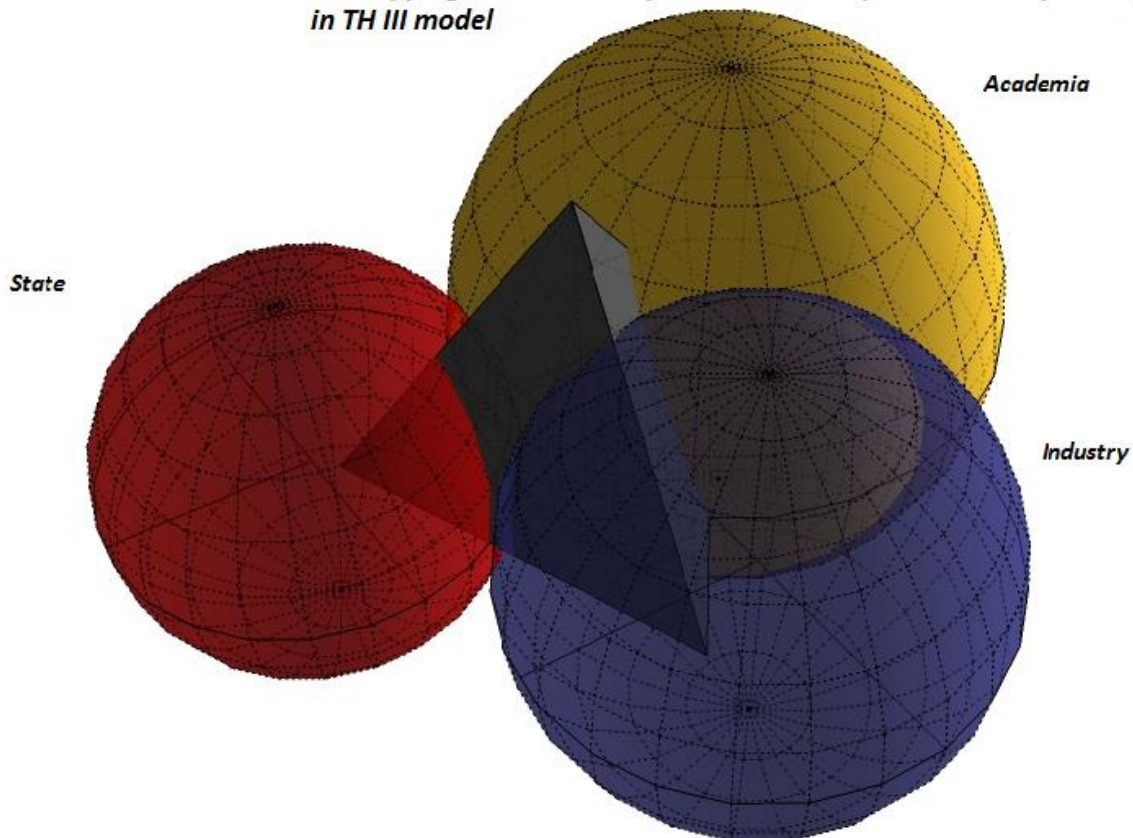
Academia

Industry

Triple Helix III model



Overlapping Institutional Spheres-the case of Academia superiority in TH III model



Schumpeter adopted the view (following Smith, Ricardo and others and contra Marx) that capitalism is a desirable system. Within the system creative destruction is a positive process; that is, to move forward, to progress, capitalism must engage in “creative destruction”. The term is derived from Marxist economic theory and describes the idea that capitalism destroys and reconfigures previous economic orders, but also that it must continuously devalue existing wealth (whether through war, dereliction, or regular and periodic economic crises) in order to clear the ground for the creation of new wealth (Marx and Engles,[1848];Moore and Samuel,[1888];Marx[1863];Lawrence and Wishart,1993;Marx,[1857];Martin,1973). While essential point to for Schumpeter is that in dealing with capitalism we are facing a situation of a perpetual evolutionary process which might not even end and thus changing nature of capitalism Marx emphasized its self-destructiveness because of its structural contradictions within capitalism which necessitate its end, giving way to socialism, or a post-capitalistic, communist society.

Since there are three important dimensions: the economic, political, and socio-cognitive potentials for a change such (Leydesdorff,1012) is the case with Tetraktys which increases the influence of the relevant institutional sphere of Academia, State and Industry in the point of superiority over the other results in images of Socialism, Capitalism or and Knowledge based Era in which the production and distribution of surplus is based on different perception, quality of technology and natural resources. My assumption in short is that if State prevails over the rest of the spheres then a Socialistic TH model occurs(Etatistic). If industry prevails then we face an evolving nature of Capitalism(laissez faire). Finally it is the institutional

sphere of University which apart from consultancy, entrepreneurial and a distribution mechanism of knowledge might also prove to be a major source of political thought as well as a planning economy mechanism up to the desired and socially accepted level.

Based on neopythagorean Tetraktys one can also observe 6 combinations. In the center of this triangle we locate the prevailing institutional sphere that leads respectively to two different systems. Hence, Industry Superiority overlapping the other two will lead to laissez faire mode of innovation but taking account the evolutionary economics this implies a next evolving status of Capitalist one which incorporates the occupation of University and thus knowledge by companies with the aim to assist market expansion and destined to face the bad consequences of privatization of public education with dire consequences in terms of access and affordability of knowledge. State superiority evokes images of Socialism or more generally a status where governments play a crucial role in planning the national economy. State superiority also represents the victory of politics instead of the market dominance that a laissez faire model supports. The implicit message of this figure is that the actual space that each of institutional sphere occupy in innovation process generate different system treatment. In other words, a culmination of University might generates an innovation model in which the second institutional sphere, let us assume that this is State spurs innovation differently(through a planned economy) than the combination which occur adversely with Industry occupying the second power which will seek policies favoring market orientation and trade liberalization. So each institutional sphere in superiority generates two other (sub)systems in which the second institutional sphere promotes different practices and policies.

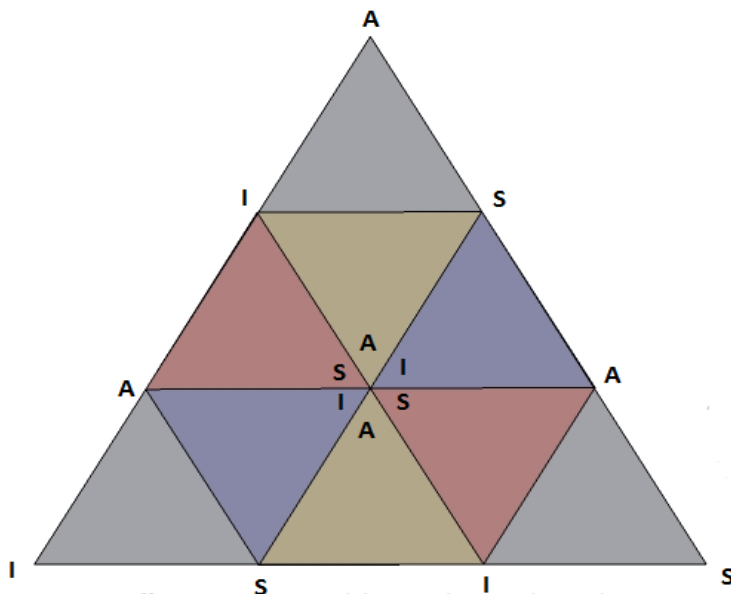


Figure 8: Differing Innovation models occur also according to the sequence of Academia, State and industry and their respective space they hold

3. Innovation on the Horizon

3.1 Innovation and Tetraktys Model

Based upon the Triple Helix model of innovation, Tetraktys model evokes the very same essence of knowledge production. More specifically each sphere gains increased ability to interact, collaborate and support innovation which arises in other spirals and in this way scientific knowledge becomes even more central to innovation while the concept of innovation as such is broadened from the business application of new technology to enhancement of the social arrangements that enhance innovation. In a knowledge-based economy, as opposed to a political economy, the structure of society is continuously disturbed by transformations which originate from the techno sciences resulting in a relevant change in the framework of society (Etzkowitz,2007). In a political economy only two types of communication are prevalent, namely (a) the equilibrium-seeking dynamics of markets and (b) normative control mechanisms along the public–private interface. In the analysis of knowledge based economies a third subdynamic, that of (c) the equilibrium-upsetting dynamics of socially organized knowledge production has also to be considered. This background though dictates a quite different role of the university in the “capitalization of knowledge” by organizing technology transfer to existing firms and by starting new firms in addition to its traditional supporting role of transferring knowledge.

Advances in the state of knowledge have been responsible for much of the economic development historically. The key component of a knowledge economy in our age is a greater reliance on intellectual capabilities than on physical inputs or natural resources and over the past decades a vast number of scholars and commentators have argued that the leading edge of the economy in developed countries has driven by technologies based on knowledge and information production and dissemination. Key sectors of the economy are more reliant on knowledge generation and dissemination today than they were in the past.

A challenge for social science has been to find metrics to gauge the extent to which society has become more dependent on knowledge production and while there is wide recognition of the importance of knowledge and intangible capital in fostering economic growth and social change, it is still difficult to find useful measures of these assets (Walter and Snellman,2004). In other words, although the process of innovation is a crucial aspect of economic growth, the problem of measuring innovation has not yet been completely resolved. A central problem involved in such analysis is the measurement of economically useful new knowledge. So, our understanding of the role of knowledge in economic activity has traditionally been guided by the state of the measurement of knowledge while such data have always been incomplete and, in the best case scenario, as represented only a proxy measure reflecting some aspect of the process of technological change as Acs et al., argue to believe. For them the typical measures of technological change have involved one of the three major aspects of the innovative process: (1) a measure of the inputs into the innovation process, such as R&D expenditures; (2) an intermediate output, such as the number of inventions which have been patented; or (3) a direct measure of innovative output. During the 1950s and 1960s, our understanding of the economy was advanced by developing measures of research and development (R&D), an input measurement, as a proxy for innovative output but this indicator (R&D) suffers from measuring only the budgeted

resources allocated towards trying to produce innovative activity. During the 1970s advances made in the use of patent data, an intermediate measure of economic activity, as a proxy for economic output. Although patents are good indicators of new technology creation, they do not measure the economic value of these technologies (Hall and Trajtenberg,2001). According to Griliches and Pakes “patents are a flawed measure (of innovative output) particularly since not all new innovations are patented and since patents differ greatly in their economic impact(Griliches,1979;Griliches and Pakes,1980).

Many studies have tested the relationships between research universities and regional performance, operationalizing the impact of universities on regional development with one or a few university products²⁷ . The scope of this chapter is not to prove this relation but rather take those finding as granted so as to investigate the differences which occur in the major innovators and research centers. Generally, the positive role of the university in regional economic performance is evident. Findings coming from the work of Iryna Lendel show that the presence of research universities has a positive effect on metropolitan economies above cyclical economic changes while the effect differs depending on the scale of university R&D expenditures and suggests that the most prominent research universities have a stronger impact on their regional economies (Lendel,2010). The influence of local university research spillovers is under-measured and in many cases underestimated eventhough there is a strong correlation with the amounts of R&D received to promote knowledge and economic growth.

3.2 West is running out of Batteries

There has long been a long controversy over the role of the university in servicing the needs of sub-national economies and civil societies, those of the national state and those of learning and the pursuit of knowledge in an abstract sense. The position in liberal democracies through much of the twentieth century can be accurately characterized by a significant degree of separation and segregation between the university, the state and the market. Recently, however, it has been noticed that the balance is shifting away from relative autonomy towards a new ‘mode of knowledge production’ in which the growing engagement of universities with their regions and localities is an important aspect.

Government and industry have been the major social institutions since the 18th century. Nowadays, it is more than apparent that their role in forming innovation has expanded and given the complexity of institutional relationships which up to a specific extent are stimulated by globalization, they are even deeper correlated. Etzkowitz tries to decipher the enigma that monopolize the focus of attention of this section and that could be no other than the reason why the university plays a key role of the university in knowledge-based societies. For Etzkowitz it is the competitive advantage of the university over other sources of knowledge namely R&D units of firms or government laboratories which make the difference. The reason is as simple as well observed: The accumulation of knowledge through students who not only count as a huge pool of leading innovators and researchers but also as means of transportation of the knowledge after their graduation towards firms and governments.

²⁷ See Beeson and Montgomery (1993), Link and Rees (1990), and Gottlieb (2001) about the impact of universities on local labor markets, Acs, FitzRoy, and Smith (1995) about university spillover effects on employment or Bania, Eberts, and Fogarty (1993), about business start-ups from the commercialization of university basic research, Adams’s (2001) and Adams, Chiang, & Starkey’s (2001) findings about the positive effect of the geographic proximity of university research on industrial research etc

The growing interest regarding intangibles and intellectual capital (IC) has extended from firms to public institutions such as universities and research centers during the last decade. Since universities are considered critical institutional actors in national innovation systems, European higher education and research institutions are going through an important transformation process with the aim of making them more comparable, flexible, transparent and competitive. The modern university is faced with a two-fold challenge: while society presents it with new and growing demands, at the same time the state applies increasingly restrictive policies to the funding of its activities. The combination of these two factors is reflected in a growing diversity of funding sources and mechanisms²⁸. In this respect, the university sets itself the task of examining the quantitative and qualitative needs of its activities and of finding new ways to exploit its scientific and technological potential (Brooks,1993), while striving to maintain its effective autonomy (OECD,1987). Those efforts imply that apart from the traditional role of the university in education and research, a wide range of other activities, usually grouped together under the heading of “provision of services” or “links to society,” are now part of the university’s mission (Rosenberg and Nelson,1996).

Despite the increasing diversity of funding sources, in most university systems around the globe the state remains the main or sole funding source (Eicher and Chevalier,1993). But the growing pressure to reduce public spending, the emergence of demands arising from other social policies, and the rethinking of the relationship between state and public bodies in general, all put considerable pressure and great obstacles on public funding of universities (Ernst,2011). Neoliberal political dogma has contributed a lot in forming this perception about modern university since individual ability to pay and sole monetary valuation is promoted through the markets in an effort to besiege the walls of modern universities.

When it comes to innovation in science and technology, the United States has been the recognized global leader since the end of World War II but now the first position seems to be at stake. As we saw previously, one of the five regional models is that one of China’s market socialism. More specifically, during the last three decades, since China has being opened to the world economy, it has become a serious competitor, not only in terms of price, but also in terms of technology. Patent applications by Chinese companies have increased dramatically, as are R&D investments and the number of science and engineering PhD graduates. In short, China has become one of the leading countries in science and technology publications and in high-tech industry exports. The salient difference between the two major powers can be found in the mean of innovation. Thus, while the US government which promotes the Anglo-American capitalistic regional model of innovation, believes that markets should drive innovation, China’s government emphasizes the critical role of public policy in fostering indigenous innovation (Ernst,2011). At least, so does Dieter Ernst states in an article on behalf of East – West Center²⁹. He believes that US government and the private sector need to jointly upgrade its own innovation system in

²⁸ Caraca, J., Conceic P., and Heitor, M. V.: On the Definition of a Public Policy towards a Research University, Higher Education Policy (in press).

²⁹ Established by the U.S. Congress in 1960, the Center serves as a resource for information and analysis on critical issues of common concern, bringing people together to exchange views, build expertise, and develop policy options. The Center is an independent, public, nonprofit organization with funding from the U.S. government, and additional support provided by private agencies, individuals, foundations, corporations, and governments in the region

order to cope with the challenge of China's innovation policy which clearly differentiates from west traditional innovation policies. Few years ago, China's approach to innovation could barely perceived as leading in international economic diplomacy but this has changed since China increasingly demonstrates its economic power and competitive advantages. Nowadays, China's innovation policy is perceived as threat to American innovation adding continuous disputes about exchange rates, trade and foreign direct investment (Ernst,2011).

The conflicting perception of China's policy heavily relies on the government to define the strategic objectives and key parameters. On the other hand, US leadership believes that reforms of China's innovation system will naturally converge to a similar style market led system. Yet, as Ernst states "limited convergence goes hand in hand with persistent differences". The primary concern of China's leadership is to catch up with the productivity and income levels of the United States, the European Union and Japan while US government believe that government intervention and initiatives regarding innovation policy "unfairly favors domestic producers at the expense of foreign firms" and because of its "threat to global intellectual property protections, fair government procurement policies, market competition and the freedom of US companies to decide how and when to transfer technology" (Marantis,2010).

In reality, the most important difference that occurs in China is the implementation of its innovation policy through its planned economy (Ernst,2011).To say this in other words, China's failure to protect IP is a result of state ownership of firms and control over the economy (Stevenson-Yang and DeWoskin,2005). Anne Stevenson-Yang and Ken DeWoskin are inclined to believe that China's failure to protect has little to do with stages of development or cultural attitudes. On the contrast, it is government's ownership and control over the economy, which undermines private property rights—especially the intangible kind. For the authors this creates economic instability that makes it difficult for innovation by domestic companies to be rewarded, and thus be sustained. They believe that government actually obstructs the path to market of inventions that are blooming in laboratories and start-up companies all over the country in its effort to create national IP. "That's because these conflict with the commercial interests of politically supported state companies that innovate far less than private, entrepreneurial ones" (Stevenson-Yang and DeWoskin,2005). However, as Ernst argues, the amount of data coming from the Battelle Memorial Institute³⁰ shows that China's innovation policy seems to be highly effective: "From an R&D standpoint, it's very difficult to find fault or weaknesses in any of the policies China is pursuing" (Battelle,2010). But let us now see what might be responsible for China's leading innovation policy.

In the Knowledge based economy, policy makers around the world, more than ever recognize the importance of long-term R&D and basic research. To the extent that policymakers want to increase the spillover from publicly financed to privately supported R & D, research suggest that firms should be encouraged to work with government agencies in the design of publicly financed R&D projects. Thus, it makes sense why China, US, European Countries and the rest of the world seek to find sources to invest in R&D process. In this respect, since 2000, China has made massive investments in R&D infrastructure

³⁰ Battelle Memorial Institute is the world's largest nonprofit research and development organization.

“on scale and speed never seen before”(Battelle,2011). China’s R&D spending has increased roughly 10 percent each year and this pace of investment has been maintained even during the 2008-2009 recession and clearly sets China apart from the crisis-induced cuts in the United States and Europe (Ernst,2011). More thoroughly, China’s share in R&D spending has increased from 9.1 percent in 2008 to 12.3 percent in 2010, while for the US the relevant spending was decreased from 35.4 to 34.4 percent.

Moreover, regarding the treatment of Universities’ funding China’s superiority is more than apparent. Its government, from 1998 is heavily investing in higher education and universities and one can see the results of those investments since the amount of GDP devoted to the expansion of education has tripled (Ernst,2011). From 1998, the number of colleges has doubled while the number of students quintupled from 1 million in 1997 to 5.5 million in 2007 (Ernst,2011). “At a time when universities in Europe and state Universities in the US are suffering the impact of budget cuts, China is now moving in the opposite direction”(Battelle,2010). Of course those budget cuts in education on behalf of western countries raise more than pure economic concerns since education as we have already seen is responsible not only for the creation of knowledge but is also responsible for the societal peace as such. Yet, public education is under attack around the globe, and in response, student protests have recently been held in Britain, Canada , Chile, Greece , Taiwan and elsewhere. Tuition fees are on the rise and privatization goes deep into the bone of public coherence. Jane Wellman, former director of Delta Cost Project notices that tuition fees have increased up to 600 percent since 1980 in US and that those fees produce “far more economic stratification than is true of any other country” (Ernst,2011).As a result students are trapped into long-term debt and therefore subordination to private power. Ernst indicates that, the successful innovation policy is also reflected in the increased number of domestic science and engineering doctorate. In this sense, the number of doctorates awards has increased more than tenfold since 1990 to about 21.000 in 2006- nearing the number of science and engineering doctorates awarded in US (National Science Board,2010).

Furthermore, regarding the previous mentioned increase in doctorate awards, China’s government seeks to repair some of the qualitative problems connected with the increase of university graduates. Ernst attributes the vast number of exchange programs between universities and industry in the general effort to reduce the mismatch between curricula and required skills that have given rise to graduate unemployment. Likewise the international cooperation with leading universities around the world,both strategies target the improvement of the quality in teaching and postgraduate education (Ernst,2011).

Last but not least, research on output indicators comes to verify the success in innovation policy that China follows. Thomson Reuters, the world’s leading source of intelligent information for businesses and professionals, states that China’s patent market is booming. From 2003 to 2007 Chinese invention patent applications grew at 28.4 percent per year, overlapping China’s GDP average annual growth rate of 9.75 (Zhou and Stembridge,2010). In general, the total patenting activity of China has overtaken Korea and Europe while is already moving towards the pace of patenting activity of US and Japan (WIPO,2010).

4. Pharmaceutical Industry under the microscope

4.1 Pharmaceutical Industry in Europe

As well as contributing to the longevity and well-being of every European citizen, the researched-based pharmaceutical industry is a key asset of the European economy representing no less than 19.2 % of total EU private R&D expenditure and 3.5 of EU manufactured exports. The industry employs approximately 635.000 people of which 117.000 work in R&D in Europe. Furthermore, with an estimated share in 2008 of 31.1% of world pharmaceutical output, a global output of nearly €196 billion, and sales of €133 billion the EU pharmaceutical industry is one of Europe's best-performing sectors. The EU as a World leader in the trade of pharmaceutical products, enjoying a trade surplus of €47.8 bn in 2010, a steady growth in exports witnessed since 2001 and an ability to adapt to and enter new and growing markets. It does, however, face strong competition from traditional producers such as the US and Japan, along with growing competition from fast developing economies such as China and India.

While there are many different types of pharmaceutical medicines, broadly, as a sector, pharmaceutical products can be placed in either of two camps: the innovative one and the generic. Innovative pharmaceuticals are essentially 'new' medicines brought to market, that remain under patent protection so as to secure enough sources for the R&D process. Once patent and data protection have expired (also referred to as loss of exclusivity), other pharmaceutical companies are able to market their own, identical and cheaper versions, labeled "generics", of the previously patented, innovative medicine. A number of the large innovative pharmaceutical companies will finally produce both types of products while there are many generic-only companies that are located in various countries. Both innovative and generic pharmaceutical firms share many trade barrier problems in terms of non-tariff barriers (NTBs)³¹ and general market access issues, while tending to hold divergent positions on some issues i.e. length and nature of Intellectual Property Right (IPR) protection.

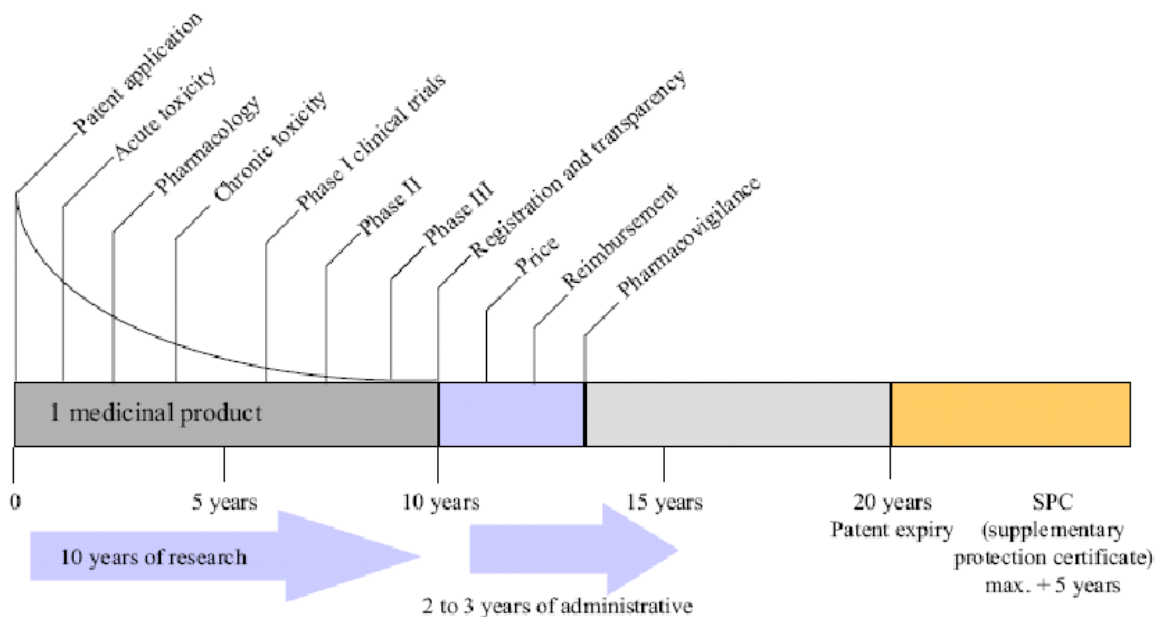
No one can deny that the pharmaceutical market does not meet all the criteria of a perfect market. For example, the complexity of the supply chain (involvement of insurance companies and physicians), the high R&D costs and the relevance of the pharmaceutical market for public health leads to various distortions which partially are solved through government regulation.

³¹ NTBs are trade barriers that restrict imports but are not in the usual form of a tariff. Some common examples of NTB's are anti-dumping measures and countervailing duties, which, although they are called "non-tariff" barriers, have the effect of tariffs once they are enacted.

4.2 R&D funding

Pharmaceutical R&D is the process of discovering, developing, and bringing to market new ethical drug products³². In this subchapter I am going to present two conflicting approaches regarding the costs that occur in R&D of pharmaceutical products. While the first one is considered as common perception among economists and policy makers, the other one represents a severe criticism of the high costs that are presented as an obstacle to bring up new medicines and one that if proves correct, it will radically change the way we perceive research and development in pharmaceutical industry and therefore clearly will generate doubts about the integrity of pharmaceutical work that is done in order to promote and secure the health of populations. The reason for such argument is simple and well measured: High research and development costs influence many decisions and policy discussions about how to decrease global health inequalities, how much companies can afford to discount prices for lower- and middle-income countries, and how to design innovative incentives to advance research on diseases of the poor.

The pharmaceutical industry is an industry that uses its profit margins to pay for substantial R&D. This is the main reason why innovation and more particularly the R&D process is deemed so important. It accounts for a large share of the costs of pharmaceutical companies, and is of prime importance in the lifecycle of drugs development. The figure below offers an overview of the route of a new pharmaceutical product from the discovery to patient's access and clearly demonstrates the importance of R&D in the lifecycle of pharmaceutical products. On a global scale the pharmaceutical sector stands for the highest R&D spending sector in the world. In 2006, approximately €70.5 billion was spent on pharmaceutical-related R&D that led to the first launch of 25 new molecular entities and 7 biologicals worldwide (ECORYS,2009).



Source: World Health Organisation, 2006, The pharmaceutical industry in Europe, key data, PowerPoint

³² Ethical drugs are biological and medicinal chemicals advertised and promoted primarily to the medical, pharmacy, and allied professions

All new medicines introduced into the market are the result of lengthy, costly and risky research and development (R&D) conducted by pharmaceutical companies. This becomes apparent if someone captures the time and costs involved for the production of a mere pharmaceutical product:

- By the time a medicinal product reaches the market, an average of 12-13 years will have elapsed since the first synthesis of the new active substance;
- The cost of researching and developing a new chemical or biological entity was estimated at € 1,059 million (\$ 1,318 million in year 2005 dollars) in 2003 (DiMasi,2007).
- On average, only one or two of every 10,000 substances synthesised in laboratories, will successfully pass all the stages to become marketable medicines.

The most widely cited estimates for the cost of the discovery and marketization are 802 million US dollars in 2000. This has been updated by 64 per cent to 1,32 billion in 2006. Light and Warburton based on simple mathematics state that with this pace of innovation costs and with another 64 per cent by 2012, the average cost would skyrocket to 2.16 billion or approximately 2.7 times the 802 million estimate. Big Pharma has been making its R&D argument for half a century, but the specific source of the \$1 billion claim is a 2003 study published in the Journal of Health Economics by economists Joseph DiMasi of Tufts, Ronald W. Hansen of the University of Rochester, and Henry Grabowski of Duke.

In a study published in the journal BioSocieties, sociologist Donald W. Light and economist Rebecca Warburton called into question the figure of \$1 billion to bring a new drug to market. In fact, Light and Warburton assert, that figure should be \$55 million median. The authors believe that pharmaceutical companies maximize figures for R&D and in their effort they employ supporting centres and researchers who assist them to do so. The industry's principal justification for its high prices on patented drugs stems from the high cost of R&D which receives further government protections from normal price competition and in some cases results in even increasing patent terms and extending data exclusivity, without the evidence that these measures will finally increase innovation (NIHCM,2000;European Commission for Competition,2008;Light and Warburton,2011). This is in line with what Kremer and Glennerster saw as a solution to the devastating problem of neglected diseases: the Advanced Market Commitment(AMC)³³ which was accepted by G8 as a "fiscal magic bullet" that would create incentives for corporate researchers to produce vaccines for malaria or AIDS, rests on shaky grounds that allegedly high costs of R&D for pharmaceutical companies in a space where public or university researchers had previously failed (Kremer and Glennerster,2004;Farlow,2005;Light and Warburton,2011).

Even though this study receives severe criticism for its low costs estimates in the huge arena of R&D sector, Light and Warburton's points are well worth discussing and I will briefly state their most important objections to the Tufts study. A good starting point is that the Tufts study surveyed 24 large drug companies, of which 10 agreed to participate which means that this is neither a random nor a comprehensive sample. Moreover, the drugs used for the study numbers were supposed to be "self-

³³ Binding contract, typically offered by a government or other financial entity, used to guarantee a viable market if a vaccine or other medicine is successfully developed with the goal to enable biotech and pharmaceutical companies to invest in the development of new vaccines to tackle the world's most pressing health problems, such as pneumonia, diarrheal disease, HIV/AIDS, and malaria, in the normal course of their business decisions.

originated", but since we don't know which drugs they were, it's impossible to check this which further evokes some implications. Since the companies reported their own numbers, we do not know which drugs they were reported and secondly, no one can be sure about the variations in how companies assign costs to R&D, which implies that we might look for the most expensive drugs.

Furthermore, the cost of capital estimate that took their estimated cost for a new drug from 400 million to 800 million. The first compound of this argument is whether we should calculate opportunity costs of capital while the second one targets the 11 per cent of returns on investment which is considered to be too high. Based on equity returns between 1985 and 2000 (adjusted to remove inflation) the authors claim that "compounding at 11 per cent doubled the estimated cost for R&D from 403\$ million to a total pre-approval cost estimate of 802 \$ million (2000 dollars)" (Light and Warburton,2011).

Finally, there is a tax situation. The Tufts authors argue that "special tax provisions for R&D should not be considered tax breaks, and that the gross costs of R&D should not be reduced by tax savings" (Light and Warburton,2011). Light and Warburton inform us that this make sense if R&D were treated like other long-term investments, and depreciated gradually over time, but R&D costs come from gross profits and create a 100 per cent immediate deduction from taxable profits (Light and Warburton,2011). In other words, the \$1.3 billion estimate does not include the substantial contributions by taxpayers through R&D-related tax write-offs. Taxpayers indirectly pay for about 39 percent of company R&D, a substantial reductions in a company's net costs.

Taking everything into account, this study strengthens the view that drugs companies overestimate the prices to recover R&D costs, and their corporate risks. Most of their R&D products are scores of drugs with only few proven advantages over existing drugs that can command higher, government-protected prices. Gross profits are spent more for marketing than research in order to maximize the number of patients taking these drugs. A large number of clinical trials are conducted for marketing and signing up lead clinicians.

4.3 The current patent system

Intellectual Property Rights(IPRs) most notably known as patents, copyrights trademarks and trade secrets are deemed as a tool to provide the foundation for building and extending markets for new technologies. In short, IPRs are legal instruments to protect someone's intangible assets (or physical assets), converting intellectual property into property by granting a legal title which entitles to the owner the right to prevent others from exploiting. The main economic challenge raised by the patent system is to keep a balance between the social objective of ensuring efficient use of knowledge, once it has been produced, and the objective of providing ideal motivation to the private producer.

Regarding an acute terminology of patent system which occur I trace the forthcoming paragraph from an OECD documentation: "A patent is an exclusive right to exploit (make, use, sell, or import) an invention over a limited period of time (20 years from filing) within the country where the application is made. Patents are granted for inventions which are novel, inventive (non-obvious) and have an industrial application (useful). There are other types of exclusive rights over intangible assets, notably

copyright, design protection and trademarks, but patents provide a broader protection that extends beyond the specific expression of an invention to the invention itself. Due to this control over the technology, the patent holder is in a position to set a higher-than-competitive price for the corresponding good or service, which allows recovery of innovation costs. In return, the applicant must disclose the invention in the text of the application, which is published 18 months after application. As a patent is valid only within the country in which it is granted, it is subject to national laws and litigation settled in national courts. The forthcoming community patent in Europe will be an exception, as it will provide protection in all EU member countries, and litigation will be centralised in a specialised court. International agreements such as the agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS), signed in 1994 and overseen by the World Trade Organisation (WTO), tend to place restrictions on what national laws and policies can do. TRIPS introduced intellectual property rules into the multilateral trading system for the first time, in an attempt to guarantee the same minimum standards of protection across countries (OECD,2004).

The effect of stronger intellectual property protection in the pharmaceutical market is perpetual and focused in recent years on the World Trade Organization's (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).The World Trade Organization's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) set global minimum standards for the protection of intellectual property, substantially increasing and expanding intellectual property rights which generate clear gains for the pharmaceutical industry and the developed world. But the compliance to those agreements was postponed until 2005 for developing countries and 2016 for least developed countries. The agreement greatly expanded intellectual-property rights, including rules on the protection of test data for the effectiveness and safety of drugs. This change in intellectual-property rights generated clear gains for industry and the developed world, but still than important question is whether it generated gains for developing countries in the form of increased exports as well as social benefits in creating truly innovative drugs.

The new regime though, raises international economic policy questions as well ethical issues. As Keith Maskus states stronger IPRs protection should increase incentives for innovation and raise returns to international technology transfer but also it could increase the costs of acquiring new technology and products, shifting the global terms of trade in favor of technology producers and against technology consumers (Maskus,2000). While the pure economic motivation concerns profits and gains between customers and producers the ethical one follows another perspective which targets pharmaceutical industry's prioritization of profit over health. Strict patents reduce the availability and affordability of new essential drugs in developing countries, and thereby have a negative impact on the health of the world's poor. Larger pharmaceutical companies benefit more than smaller companies because they have a monopoly in the industry. They invest more in R&D and, linked to economies of scale, are better positioned to exploit markets for new drugs. A striking example highlights the importance of generic production and essential drugs in developing countries. It shows that while TRIPs promotes economic growth of the industry and encourages investment in R&D of new drugs, it increases the prices of new essential drugs, therefore isolating benefits from the majority poor populations in developing countries.

While a lot could be said about the motivation to patent³⁴, the patent system still performs its traditional mission to a large extent toward a greater propensity to patent and since this thesis indulges in knowledge based economy in which knowledge seems to occupy a most profound position among other forms of capital few things should be said about the role of patents as a mean to exclude and diffuse the knowledge value. In this sense, Dominique Foray believes that patent provides an obvious and well recognized solution to the economic problem of the intellectual creator since it works as an incentive mechanism to spur knowledge production. For him the problem is located to the exclusive rights that patents generate which restricts de facto the use of knowledge and its exploitation by those who might have benefited from it if this knowledge was offered freely. He is inclined to believe that the holder of knowledge is not necessarily “in the best position to use it efficiently” and that the greater the distribution of knowledge that is passing from hand to hand, the greater the probability of it to be exploited effectively (Foray,2002). A good balance between exclusivity and dissemination brings up benefits which especially in case of pharmaceuticals are of crucial importance in terms of information and co-ordination because patent databases account for “a unique medium for knowledge externalities”. That is why the granting of property right as regards the protected technique is escorted by public disclosure (Foray,2002). The critical factor though to find this balance stems from the very character of knowledge considered and since the cumulative knowledge³⁵ has to be recognized :”the social cost of exclusion increases as knowledge becomes more cumulative. For him there has to be a distinction in terms of treatment between a consumption good and knowledge as an investment good which is likely to spawn new (knowledge) goods. “The more cumulative the use, the more social losses will be generated by stronger IP rights”. Finally, for Foray, this unprecedented expansion of the knowledge market and the proliferation of IPRs on whole areas of intellectual creation is partly driven by three types of institutional changes that are resulting in a privatization of knowledge that used to be a public good!

- powerful commitments to basic research by private firms in certain sectors (this is, for instance, the case in the genomics area where we can observe the emergence of a new generation of firms that are highly specialized in fundamental research and are, therefore, in direct competition with the public research institutions);
- changes in the behaviour of open science institutions which are increasingly oriented toward the promotion of their commercial interests;
- privatization of governmental civilian agencies which become major players in the contractual research market

There is a hot debate whether we have to change the current patent system or to make additional reforms. Well, in any case what is vehemently needed is to strike the right balance between the production and the distribution of new ideas. The dissemination of new ideas which further facilitate production was never that important as it is today and this becomes apparent when Harvard University encouraged its faculty members to make their research freely available through open access journals

³⁴ For example see e Rassenfosse et al. ,Motivations to Patent: Empirical Evidence from an International Survey,

³⁵ Cumulative or distributed knowledge is the union of all the knowledge of individuals in a community.

and to resign from publications that keep articles behind fees that are too heavy afford. This recent movement on behalf of the world's wealthiest and most prestigious institutions over access to the results of academic research clearly reminds that knowledge funded by taxpayers have to take another a more "public form"³⁶.

4.4 Parallel Trade

Grey markets...Neither white nor black but a color in the middle is used to express the whimsical function of parallel markets where, a legal trade activity yet unofficial, unauthorized as well as unintended by the prospect of manufacturer, takes place. Parallel imports (PIs) can be defined as legitimately produced goods imported legally into a country without the authorization of a trademark, copyright, or patent holder. The legal doctrine governing the permissibility of parallel imports is exhaustion which further is divided into national, international and/or regional(Europe). Under national exhaustion the rights holder may prevent such importation while under international exhaustion PIs are legal. "The essential purpose of such trade is arbitrage between countries with different prices" (Ganslandt and Maskus,2004).

Exhaustion of IPRs means that right holders lose the right to control the resale of the protected goods. Without an exhaustion doctrine IPR holders perpetually exercise control over the sale, transfer or use of the relevant goods, and would have a grip on commercial relations. In this sense article 6 TRIPs leaves WHO member countries free to adopt national, regional or international exhaustion regimes. If a country chooses a national exhaustion of IPR, a rights holder there may exclude parallel imports, because intellectual property rights continue until the time in which a protected product is first sold in that market. If a country instead chooses international exhaustion of IPR, parallel imports cannot be blocked, because the rights of the patent, copyright or trademark holder expire when a protected product is sold anywhere in the world (Grossman and Lai,2006). While The U.S practices national exhaustion for patents and copyrights and permits parallel imports of trademarked goods unless the trademark owner can show that the imports are of different quality from goods sold locally or otherwise might cause confusion for consumers, the European Union provides for regional exhaustion of IPR whereby goods circulate freely within the trading bloc but parallel imports are banned from non-member countries. Regarding the exhaustion of IPRs in the United States there have been proposals to permit parallel imports from Canada (and other countries) in the last several years. Re-importation of drugs was an important campaign issue in 2004 for Senator John Kerry and the subject of a Congressional Budget Office study (Kyle,2007). In addition to this, nongovernmental organizations such as Doctors Without Borders/Medicins Sans Frontieres have lobbied with the aim to promote a policy of "international exhaustion" of patent rights, which would remove the current barrier of IP rights to parallel trade in most countries (Kyle,2007).

The majority of the studies within the field analyze the factors determining Parallel Trade penetration (measured as Parallel Trade sales as a percentage of total drug sales) and the impact of Parallel Trade on the price level in primarily importing countries. Some also try to quantify the total level and distribution of savings that arise from Parallel Trade. Be that as it may, the common denominator on these studies is

³⁶ Article available at: <http://www.guardian.co.uk/science/2012/apr/24/harvard-university-journal-publishers-prices>

disagreement. Some researchers believe that price savings are high (Enemark et al,2006) while some others claim that parallel distributors (PDs) are the main beneficiaries (Maskus,2001;Kanavos et al.,2004;Poget,2008). Furthermore, opponents of parallel trade, as -Gene Grossman and Edwin Lai claim- are many and they are concerned that such trade undermines manufacturers' intellectual property rights because it impedes the ability research-intensive firms to reap an adequate return on their investment in new technologies. This argument is more than often in the center of the dispute and is expressed by many authors for at least two decades now (Chard and Mellor,1989;Bareld et al.,1998;Danzon and Towse,2003).

The truth is that consumer do benefit from parallel importation. Frederick Abbott claims that policy of open parallel importation generates consumer surplus and public welfare benefit by: (a) providing consumers with lower prices for the same products; (b) making patented pharmaceutical products more accessible to lower-income individuals, and; (c) reducing strain on public health budgets, including with respect to publicly-funded public health programs (Abbot,2007). Moreover, in his effort to assess the industry argument for bigger profits to stipulate R&D process, he states that this argument is based on the premise that higher levels of income will lead to increased investments in R&D, ultimately creating new products but the reality shows soothing entirely different. The originator companies on average prefer to invest about 15% of their gross income on R&D while on the same time it spends a substantially higher percentage of income on advertising, promotion and administration. Furthermore, much of the advertising and promotion costs are spent on "lifestyle" drugs like Viagra and also a considerable R&D spending is directed to lifestyle products and minor variations on existing therapies, the so-called "me too" drugs. Supporting the notion of parallel trade Frederick Abbott says that parallel imports are "genuine" products regardless of the initial place located on the world market (labeling of course must be translated and adapted for different markets). "Parallel import medicines are not counterfeit medicines; that is, they are not unlawfully produced medicines of potentially sub-standard quality" (Abbott,2007).

In relation to the price of pharmaceuticals, another important issue that is still under-investigated is third price discrimination. Standard economic theory describes third-degree price discrimination as a situation where customers are charged different prices for the same product for unrelated reasons to costs of production or the quantity sold. Firms have moved from using third-degree price discrimination to a form of second-degree, through increasing product differentiation by adjusting their product offering in each country to minimize the potential opportunity for parallel trade. "Versioning and culling limit the number of arbitrage opportunities" (Kyle,2007). Margaret Kyle first claims that such a strategy is costly to originators since it implies additional regulatory fees and higher production costs and then wanders whether these costs add any consumer benefit.

Generally, prices of pharmaceuticals substantially differed across Europe, reflecting differences not only in National Health Systems as such but also differences in income, regulatory systems, culture and many other factors. In the case of pharmaceuticals, the price level differentials mainly reflect differences in the way countries regulate their pharmaceutical markets and how prices are determined in negotiations between governments and the industry. The principal methods in relation to price controls that governments employ are reference pricing, approval delays and procedural barriers, restrictions on

dispensing and prescribing, and reimbursement. The financing of health care also differs across the member states giving different incentives and priorities which evokes either universal system of care free at the point of use or like the case of most member states, the provision of more or less by the independent sector-subsidies or reimbursements given to individual patients by the State. The financed public health care has pressed increasingly heavy on European tax payers for at least the past generation. Due to the longevity of people, chronic or incurable diseases as well as palliative treatments make the financing of Health Care Systems complex and expensive while those costs are expected to rise even more in the near and distant future. Government spending on Health National Systems has increased by 50 per cent in money terms since 1997 (Pollard et al., 2004). Furthermore, the 2002 budget outlined plan to increase spending by a further £18 billion over the next three years (Groom,2002). In France, the health service may be as much as €14 billion per year in deficit by the end of 2004 (Mortished,2004). In every European and non-European country the cost of Health Care Systems seems to be a great burden giving extra pressure on their public deficits.

The establishment of a single European market challenged the price discrimination that was widely practiced up until then by the pharmaceutical industry, as the EU pursues “regional exhaustion” which is permits re-importation(goods once purchased may be freely resold) within the EU. The European Court of Justice has declared that free circulation of goods take precedence over IPR and also established the circumstances under which repackaging is permissible through a number of decisions³⁷. Within the single European market, key changes in the harmonisation of regulation under the EU’s mutual recognition procedure, and Articles 28–30 governing the free movement of goods have fostered an environment where parallel trade can capitalise on pharmaceutical price differences across countries. Apart from EU regulations, the parallel importer has to conform to national regulations which dictates the relevant government agency of each country to give its permission for sale of the re-imported product. Within this context, the re-imported product must be identical to the drug registered in the importing country. In order to assure the quality of the re-imported product, the competent authority in the import country will contact its counterpart in the exporting country to receive documentation on the product in question. In several countries, there is also a specific authority governing prices on pharmaceutical products, including reimported products (Arfwedson,2003).

³⁷ According to Kyle (4), these include Hoffman-La Roche vs. Centrafarm (C-102/77); Bristol- Myers Squibb vs. Paranova (C-427/93); Boehringer Ingelheim vs. Paranova (C-429/93); Bayer vs. Paranova (C-436/93); Pharmacia & Upjohn vs. Paranova (C-379/97); Boehringer Ingelheim vs. Dowelhurst (C-143/00); Merck, Sharp and Dohme vs. Paranova (C-443/99); and Aventis Pharma vs. Kohlpharma (C-433/00)

4.5 Pharmaceutical industry, Parallel traders and law implications

As we saw, at the root of the problem are price differences among member states for pharmaceutical products which are caused by national price controls. On one hand, pharmaceutical industry argues that, in the absence of legislative measures to harmonise the level of the prices on a pan-European basis, pharmaceutical manufacturers should remain free to take steps to prevent parallel traders from buying cheap product in one member state and selling it in another where prices are higher. The pharmaceutical industry points out that parallel traders are arbitragers who, by eroding profit margins in high-price member states, they also undermine industry's ability to devote adequate financial resources to R&D for new products. Furthermore, they claim that parallel traders' activities do not benefit consumers or national health systems as they keep all their profits to themselves. Parallel traders, on the other hand, argue that, even if pharmaceutical companies are simply reacting to price differences that are beyond their control, restrictions on parallel trade still remain unacceptable. Such restrictions, regardless of the circumstances are inconsistent with the fundamental goal of market integration, and would in reality violate a core tenet of EU competition law. The issue of parallel imports is at the intersection of competition law, intellectual property (IP) law, and trade law, and therefore is an important policy issue for governments and international organizations. Furthermore, as we will see Parallel trade is therefore based on the fundamental principles of the free movement of goods and the exhaustion of intellectual property rights.

Parallel trade is an entirely lawful channel of trade within the EU, and is in fact a result of the fundamental principle of free movement of goods enshrined in Title 1 of Part 3 of the EC Treaty, in particular Articles 28 & 30 . It constitutes a central facet of the integration of European economies and is strongly encouraged by the European Institutions.

For the purpose of establishing a single market for pharmaceuticals in the European Union (EU) the European Commission (EC) endeavours to preserve the free movement of goods between member states through competition in the pharmaceutical market (Abbott,1998). The Article 28 of the EU Treaty prohibits all measures which have the equivalent quantitative effect of restricting the free movement of goods between member states, including national intellectual or industrial property rights while exceptions to this rule fall under Article 30 and justify the protection of industrial and commercial property rights, the exhaustion of those rights and the pursuit of public health. It must also be said that, parallel trade is encouraged by the governments of several member states within EU, especially in countries such as UK, Sweden, Denmark, Germany and the Netherlands, where overall price levels for in-patent pharmaceuticals are at or above the European average (Kanavos and Holmes,2005). The doctrine of exhaustion of intellectual property rights has reconsidered the balance between Article 28 and Articles 30 and 295. The provisions of Articles 28 to 30 shall not preclude prohibitions or restrictions on imports, exports or goods in transit justified on grounds of public morality, public policy or public security; protection of health and life of humans, animals or plants; the protection of national treasures possessing artistic, historic or archaeological value; or the protection of industrial and commercial property. Such prohibitions or restrictions shall not, however, constitute a means of arbitrary discrimination or a disguised restriction on trade between Member States. It has to be mentioned that Article 30 permits a trademark holder to exercise his rights so as to block the sale of an imported

product bearing his trademark, if its original packaging has been modified in a way beyond what is necessary to allow its sale in the importing member state. These restrictions may not in any way constitute either means of arbitrary discriminations or hidden restrictions to trade between member states. On the other hand, member states are capable to prohibit or restrict imports and exports for the protection of public health and human life. Despite this, if the health and life of humans are effectively protected by measures which do not restrict intra-Community trade, practices that restrict trade are not compatible with the Treaty.

The starting point of the case law governing parallel trade began outside the realm of pharmaceutical products (Kanavos and Holmes,2005). The landmark case of Cassis de Dijon³⁸ in which The ECJ stated that the limitation of the free movement of goods could only be permitted in exceptional cases, for example in order to protect the health of the public, to protect the consumers or if a general public interest existed. The Cassis de Dijon Principle consequently stipulates that the member states mutually recognize each of their regulations, as long as no generally binding EU regulations exist. Accordingly, goods that have been legally manufactured and marketed in one member state (EU/EEA), may as a matter of principle also be sold in all other member states in the absence of harmonisation by rules where they are:

- a) necessary in order to satisfy mandatory requirements such as the effectiveness of fiscal supervision, the protection of public health, the fairness of commercial transactions and the protection of consumers;
- b) proportionate to the desired objective, namely that national measures must not be more restrictive than reasonably required;
- c) the means of achieving that objective which least hinders trade.

Those three requirements of necessity, proportionality and means which hinders trade are to be regarded as expressions of the general principle of “proportionality” (Kanavos and Holmes,2005).

The legal context for competition law analysis in EU is TFEU Art 101 and Art 102 (formerly Articles 81 and 82 of the EC Treaty)³⁹. Competition between economic players is protected under Articles 81 and 82 of the EC Treaty. Under Article 81, all agreements preventing, distorting, restricting competition or affecting trade are prohibited. This also includes limiting or controlling the markets, imposing export bans and imposing a differential treatment with trading parties and thus placing them at a competitive disadvantage (Kanavos and Holmes,2005). Regarding the article 82 of the EC Treaty, “any abuse by one or more undertakings of a dominant position within the common market or in a substantial part of it shall be prohibited as incompatible with the common market in so far as it may affect trade between Member States”. This would also incorporate vertically integrated supply chains where a manufacturer may abuse their position over a distributor. Examples of this abuse include the exploitation of dual

³⁸ Case 120/78 Cassis de Dijon [1979] ECR 649.

³⁹ The articles were renumbered with the Lisbon Treaty coming into force 1 december 2009. With the Lisbon Treaty, EC competition law is from now on referred to as EU competition law.

pricing⁴⁰ and pricing systems not allowing for a rational profit margin for economic players and therefore create an unfavourable market (Kanavos and Holmes,2005). A striking example is Greece which has been accused of such practices because its pharmaceutical pricing system routinely takes the lowest European price as the Greek price.

5. The role of State in shaping Health Policy

5.1 Welfare State and Health Policy

A lot could be written for the notion of State or Welfare State. “While Welfare States studies have been motivated by theoretical concerns with phenomena such as power, industrialization or capitalist contradictions , the Welfare State itself has generally received scant conceptual attention” (Esping-Andersen,1990). At least so does believe Costa Esping-Andersen, a Danish sociologist whose primary focus is on the welfare State and its place in capitalist economies. As Lyle Scruggs and James Allan says in their revision of the Three Worlds of the Welfare Capitalism, Andersen brought in a new insight to the “forefront of comparative state research: [Welfare] states may be equally large or comprehensive but with entirely different effects on social structure. One may cultivate hierarchy and status, another dualisms, and a third universalism. Each case will produce its own unique fabric of social solidarity”(Scruggs and Allan,2008). Published in 1990, the book laid out three main types of welfare states, in which modern developed capitalist nations cluster:

- a) Corporatist-Statist one in which Conservative welfare regimes have a primary goal for the preservation of traditional status differences in society thus social policy reinforce a “natural” social order and that those welfare regimes have historically been associated with significant levels of social expenditure (Scruggs andAllan,2008). They have been associated with a paternalistic state, an old-style corporatist economic order in which religion plays an important role in society. Striking examples such early welfare state developers is Bismarck’s Germany that reinforced the central role of the state or the Christian democratic welfare policies which emphasized traditional social and family roles (Scruggs and Allan,2008).
- b) Liberal Welfare regimes that seek the opposite with classical liberals supporting that traditional social patterns constrained individual freedoms and that a free market permits individuals to realize their potential, unfettered by preexisting social rankings of both church and state.
- c) The Social Democratic regime is the smallest regime cluster in which Welfare provision is characterised by universal and comparatively generous benefits, a commitment to full employment and income protection, and a strongly interventionist state used to promote equality through a redistributive social security system (Bambra,2007).

Some also commentators assert that countries of the south European Union Spain, Portugal, Greece are added into the analysis, a fourth “Southern” world of welfare emerges into, which Italy can also be

⁴⁰ A company applies a dual pricing system when it sets different prices for its product depending on the product's destination within the European Union. Kanavos et al. leave room for price discrimination following an economic perspective advocating Ramsey pricing—recovering more of the overhead (R&D) costs from those more able to pay than from others, provided that the variable costs of every sale are recovered

placed (Boboli, 1997; Ferrera, 1996; Leibfreid, 1992). The Southern welfare states are described as “rudimentary” because they are characterised by their fragmented system of welfare provision, which consists of diverse income maintenance schemes, ranging from the meagre to the generous, and a healthcare system that provides only limited and partial coverage (Ferrera, 1996). The reliance on the family and a voluntary sector is also a prominent feature. The existence of different Welfare States show how those countries under the above mentioned classification perceive welfare as well as the political reality that they conjure up.

The European Union's internal seeks to guarantee the free movement of goods, capital, services, and people – the EU's "four freedoms" – within the EU's 27 member states. The internal market is intended to be conducive to increased competition, increased specialisation, larger economies of scale, allows goods and factors of production to move to the area where they are most valued, thus improving the efficiency of the allocation of resources. During the golden ages from the 1950s to the mid-1970s, the industrial nations of Western Europe had the opportunity to develop particular national versions of capitalist welfare state and as Esping-Andersen notes their choices were in fact remarkably different (Esping-Andersen, 1990; Scarpf, 1997). Whether we speak for Social Democratic, Corporatist or liberal version, however all came down were remarkably successful in maintaining full unemployment and promoting economic growth, while also controlling in various ways the destructive tendencies of capitalism in the interest of specific social, cultural and/ or ecological values (Scarpf, 1991). As Scharpf notes, that was not fully realized and the level of success market-correcting policies did in fact depend on the capacity of the territorial state to control its economic boundaries (Scarpf, 1996). According to Sin, when this capacity was lost countries were forced into a competition for locational advantage, which is similar to a Prisoner's Dilemma game since it reduces the freedom of national governments to raise the regulatory and wage costs of national firms above the level prevailing in competing locations. Streit and Mussler believed that if nothing else changes, the competition of regulatory systems, that is generally welcomed by neoliberal economists and politicians

may well turn into a downward spiral of competitive deregulation and tax cuts that all competing countries will undergo resulting in a level protection that is in fact lower than preferred (Streit and Mussler, 1995).

One of the basic distinctions in European integration theory is that between negative and positive integration, which points to the observation that European integration involves both market-making and market-correcting policies (Scarpf, 1996, 1999). Negative integration follows the rationale of the common market, it has a deregulatory or “market-making nature”, also greatly reduces the range of national policy choices and thus, represents a fundamental loss of political control over capitalist economy (Scarpf, 1996, 1999). In short, negative integration demands that domestic regulations comply with Community Law which is quite effective in achieving liberalization in the field of competition policy by removing tariffs and other barrier to trade often in tandem with supranational agencies such as the European Commission and the European Court of Justice (Vink, 2002).

On the other hand, positive integration is an attempt to regain some power for the “political vis-a-vis society” and the market through a process of re-regulation at the European level (Vink,2002). Positive integration is a “market-shaping” because it tries to intervene in the economy and involves a broader institutional adaptation at the domestic level to a specific European model (Scharpf,1999). Positive integration takes place when European directives, regulations or soft instruments prescribe or even encourage a new institutional model at the domestic level to regulate in such areas as consumer protection, environmental policy or safety at work. And they expected to have a wide-ranging impact on domestic politics (at least de jure) (Vink,2002). However, as Scharpf notes rules are adjusted in such a way that the opposition of small groups of countries united by common interests can rarely be overruled. The veto of course remains available as a last resort even to individual countries, and the unanimity rule still continues to apply to a wide range of Council decisions. It is true though that the need for consensus remains very high for measures of positive integration, and when national interests are in serious conflict, Europe is unable to act at all (Vink,2002).

A starting point for European Welfare States and Public Health is the negative integration that member states undergo through the obedience with the obligation in TRIPS agreements. Whereas economic competition has increased globally, the countries under “European flag” find themselves subjected to a wider range of legal constraints that are more effectively enforced than is true under the worldwide regime of the General Agreements on Tariffs and Trade(GATT and WTO).

Scharpf believes that these requirements of “negative integration” are derived from the commitment, contained within the original treaties and the Single European Act whose goal is to promote the free movement of goods, services, capital and workers. He continues saying that, even though in the abstract, the basic commitment of national governments that were parties to the treaties (and thus ratified those agreements) was to establish a common market, what may not have envisaged were that the doctrines of direct effect and thus the supremacy of European Law through the European Commission and the Court of Justice had the opportunity to continuously expand the scope of negative integration. Generally, the prevailing economic community model separates the market from the state, where European markets coexist with sovereign states without a strong political control over this economic integration. Supranational level derives its legitimacy from economic efficiency and respect of individual liberty, best served by the institutionalization of a market economy which among other factors assures free competition, a strong respect for private property a strict anti-cartel legislation. And as the economic community is legitimized by the quasi superiority of efficiency and liberty there is no need for democracy at EU level since democratic legitimation is relevant only to the political realm and thus remains at national level. Economy within EU according to this concept is apolitical and thus beyond the need for democracy.

In recent years, a research area has emerged within social determinants of health that examines the role of politics, expressed as political traditions/parties and welfare state characteristics, on population health. Social determinants of health focus for social policies while Welfare states contribute to the resources available for their citizens through cash transfer programmes and subsidised services. The political economy of health and welfare regime frameworks start their analysis with politics, and endogenous consequences such as income inequality is treated as fully implicated in society, not as a

subsystem that can be perceived in isolation (Muntaner,2011). In this sense, Navarro et al.'s (2006) political economy of health framework demonstrates how politics (expressed in terms of voting behaviour and trade union characteristics), impact inequalities and population health through the expansion of welfare regimes and labour market policies. Regarding welfare state regimes, Eikemo et al. confirmed the significance of politics with their finding that welfare state characteristics can explain approximately half of the national-level variation of health inequalities between Scandinavian (Denmark, Finland, Norway, Sweden), and Anglo- Saxon (United Kingdom, Ireland) regimes, who report better health in comparison to Bismarckian (Austria, Belgium, France, Germany, Luxembourg, Netherlands, Switzerland), East European (Czech Republic, Hungary, Poland, Slovenia), and Southern (Greece Italy, Portugal, Spain) countries. Muntaner et al, finally using a genuine method guided by a political economy of health and welfare state regime framework, review 73 studies which suggest that there is an association between politics expressed in terms of democracy, globalisation, political traditions, or welfare states and population health and health inequalities after adjustment for a common range of confounders. They identified two major research programmes, welfare regimes and democracy, and two emerging programmes, political tradition and globalisation. Their primary findings also include: (1) left and egalitarian political traditions on population health are the most salutary, consistent, and substantial; (2) the health impacts of advanced and liberal democracies are also positive and large; (3) welfare regime studies, primarily conducted among wealthy countries, find that social democratic regimes tend to fare best with absolute health outcomes yet consistently in terms of relative health inequalities; and (4) globalisation defined as dependency indicators such as trade, foreign investment, and national debt is negatively associated with population health.

Finally, I would like to make a reference on Polanyi's critique of liberal political economy written in his work, *The Great Transformation*(1944). The core ideas underlying the book concern to establish that the tenets of laissez-faire are not those which govern all economies but rather they are those of a historically specific type of economy, that of the self-regulating market which came into force in England during the seventeenth and eighteenth centuries (Holmwood,2000). Individual psychology according to Polanyi is organized in terms of utility-maximizing and self-interest famously as Holmwood notes by Adam Smith as the "natural propensity to truck and barter", which is central to laissez-faire doctrine, " a product of specific historical circumstances which are unique in human history". This sound criticism is summarized in the argument that while all human societies have economies, only one has set the economy as seemingly existing outside society and further is governed by its own laws to which other human activities must be subordinated." Instead of economy being embedded in social relations", as happens in other societies Polanyi claims that in the modern economy, "social relations are embedded in the economy" (Polanyi,1944). The idea of a self-regulating economy places limits upon the state and its policy at the same time as a separate political sphere is created because as Polanyi argue "neither price, nor supply, nor demand must be fixed or regulated but such policies and measures are in order which help to ensure the self-regulation of the market by creating conditions which make the market the only organizing power in the economic sphere" Holmwood,2000).He also claims that individual motives that liberals take to be the basic and to justify market relations are far from universal in human cultures, but are the result of the self-regulating market system itself and that the market systems are the systems of freedom (Polanyi,1944).

5.2 Rationale for government intervention

It is rare today for major intergovernmental meetings and conferences not to have human rights issues on their agendas. Human rights and Human status is very much dependent with the existence of effective and affordable drugs. Prescription drugs serve as complements to medical procedures (e.g., anti-coagulents with heart valve replacement surgery); substitutes for surgery and other medical procedures (e.g., lipid lowering drugs that lessen need for bypass surgery) and new treatments where there previously were none (e.g, drugs for HIV and Parkinson's). Some of the major advances in public health -- the near eradication of polio and measles and the decline in infectious diseases -- are largely the result of vaccines and antibiotics. And, as the understanding of genetics increases, the possibility for pharmaceutical and biotechnology interventions will multiply. Nevertheless, infectious diseases exist and are among the main causes of death and disability in developing countries, and they are a major reason for the health disparity between rich and poor countries. One of the reasons for this public health tragedy is a lack of lifesaving essential medicines, which either do not exist or badly need improvements. Are there incentives to the system to facilitate the production of drugs? Push and pull mechanisms proposed in the recent literature may serve to promote research into neglected infectious diseases. High drug prices and a dearth of treatments for many neglected and tropical diseases constitute too barriers to access to medicines for many patients in the developing world.

Infectious diseases are a major reason for the health disparity between rich and poor countries (Stiglitz and Jayadev,2010). On one hand, there is a significant positive relationship between a pharmaceutical firm's expected returns and its R&D expenditures (Grabowski and Vernor,2000).On the other hand, as Acemoglu and Linn(2004) suggest, the pharmaceutical R&D is directed towards more profitable markets. At the same time the private returns to R&D for neglected diseases are much lower than the social returns to R&D for these diseases (Lybecker and Freeman,2007). This results in private firms investing less than is socially optimal. Empirical evidence suggests that the incentives from patents in the developing world are not sufficient to promote research into neglected infectious diseases that is adequate to the social and economic costs of those diseases. Push and pull incentive mechanisms are increasingly proposed to assess a market failure. While "Push" funding policies aim to incentivize industry via reducing industry's costs during the R&D stages, "pull" mechanisms create incentives for private sector engagement by creating viable market demand. Cheri Grace and Margaret Kyle believe that push and pull as motivation mechanism for technology development depends on the bearer of risk. In push mechanisms, donors fund R&D through grants and bear the development risk while in pull, it is the industry who funds and bears the risk during development with donors compensating the industry when is successful in its duty (Grace and Kule,2009). There is a perception that whenever public sector carries the risk in push, the overall costs are smaller given that public sector's cost of capital or the rate of return is lower since the cost of government borrowing is usually lower than the cost of private borrowing. What the authors also observe is that government borrowing is lower because national taxpayer provides the government with an implicit guarantee of its debt obligation and that the opportunity cost of capital for public sector needs to reflect a social return in investment in public sector (schools, roads, Hospitals etc) which elevates the required rate of return above solely the rate on borrowing. "The financial cost of capital to the public sector understates the social cost of capital to the public sector, because it ignores the implicit cost to taxpayers of underwriting those investments.

Taxpayers face a non-zero expected cost of having to bail out the government by paying higher taxes; and that expected cost is broadly equal to the difference between the market cost of capital for the public and private sectors. When appraising expenditure options, governments should (and do) take account of the overall social costs and benefits, including the social time preference rate, and not merely the financial costs reflected in market interest rates.”⁴¹ Frank Müller-Langer concluded that countries in the absence of essential drugs should be based in a combination of push and pull programs that stimulate research into neglected infectious diseases. For him, early-stage (basic) research should be supported through push mechanisms, eg. research grants or publicly financed research institutions while pull mechanisms, such as legally binding and enforceable purchase commitments or prize fund mechanisms, have the potential to stimulate research into neglected infectious diseases. In line with the previous finding is that of Cheri Grace and Margaret Kyle who also believe that “push” and “pull” incentives for technology development across are working together synergistically, whereby push is used to attract partners to engage in the work during development, and pull is used to add credibility to the eventual market incentive for the successful candidate.

6. From Pythagoras and Plato to Triple Helix model and Knowledge based Era

“The importance of an individual thinker owes something to chance. For it depends upon the fate of his ideas in the minds of his successors. In this respect Pythagoras was fortunate. His philosophical speculations reach us through the mind of Plato”

Alfred North Whitehead, Science and the Modern World

It is well known that the schools of Pythagoras, Plato, and Aristotle considered music as part of mathematics, and a Greek mathematical treatise from the beginning of our era would usually contain four sections: Number Theory, Geometry, Music, and Astronomy. Waves of mystery surrounds the figure of Pythagoras, despite the significant influence of Pythagorean thought in antiquity and in modern times. He was both a philosopher and a mathematician, a scientist and a musician. He was a political theorist and a stoic figure whose ideas were transferred through the eons. Most agreed that it was Pythagoras who systematized geometry and transported it from Egypt to Greece and then his personal stigma follows the whole science. The mystery that surrounds Pythagoras is due, in large part, to the fact that Pythagoras left no writings. His teaching was delivered orally as is the case with Socrates. From Pythagorean Theorem and Pythagorean triples to musical concords and Quantum Physics, the name of the philosopher rests on the pantheon of science contributors. However, the only coherent descriptions of Pythagoras’ life and teaching that have come down to us from antiquity we owe to authors of the third and fourth centuries BCE through the biographer of philosophers Diogenes Laertius and the Neoplatonists Porphyry of Tyre and Iamblichus of Chalcis while their information is uneven in quality. Pythagoreanism would influence later generations of philosopher such as Plato, one of the most important figures in Western philosophy who is revealed to be a Pythagorean who understood the basic

⁴¹ Owen Barder , Centre for Global Development, Public funding, private funding and the cost of capital for R&D, unpublished mimeo.

structure of the universe to be mathematical. Particularly momentous was the introduction of a strongly Platonic interpretation of Pythagoras tradition being overwritten by Platonic doctrine, to the point it became unrecognizable (Riedweg,2002). The literature review is full of commentators who increasingly advocate that the Pythagoreans numeric patterns had infiltrated into Plato philosophy and that Plato is trying to pass through his work deeper and hidden messages that better fit to the metaphysics. But Platonism and anti-platonism are justifiable views (Balaguer,2001). Mark Balaguer conclude his work by arguing that it is not simply that we do not currently have any good arguments for or against Platonism but that we could never have such an argument. The central concept of Platonism is the distinction between that reality which is perceptible, but not intelligible, and that which is intelligible, but imperceptible; to this distinction the Theory of Forms⁴² is essential.

Plato among the Greeks, was the first who conceived a method of knowledge, although he did not distinguish the bare outline or form from the substance of truth; he had to be content with an abstraction of science which was not yet realized. Plato uses a conversational prose format to investigate the nature of society, seeking to define the characteristics of an ideal society, or ideal republic. Inspired by the teachings of his mentor, Socrates, in the Republic Plato theorizes that the answer to society's illness lies not in reforming political systems but in adopting philosophic principles as guidelines. To implement and oversee these principles in society, Plato proposes the creation of what he calls ruler philosophers or individuals who will lead society into an ethical existence based on predetermined principles that are expounded in the Republic. Because of the influence of the ideas expressed in various dialogues, including the Republic, Plato has come to occupy a key position in the history of western philosophy and is often called the father of philosophic idealism.

The central theme of the Republic⁴³, Plato touches upon several major issues, focusing the most significant discussions on the nature and definition of ethics, education, and the organization of society and politics, as well as religion and philosophy. In the Republic, Plato also indicates that the three parts of the soul also correspond to the three main classes of a just society. The three parts of the soul according to Plato are the rationale, the appetite and the spirited. The rational soul corresponds to the Guardian class. This class consists of the philosopher kings. The rest of society should listen to and follow harmoniously whatever is commanded by the philosopher kings. The appetitive soul corresponds to the worker class of merchants and simple laborers. The spirited soul corresponds to the Auxiliary class of soldiers and enforcers. This group of people ensures that the dictates of reasons from the philosopher kings are obeyed by all of society.

It is important to see that the three parts of the soul each have their characteristic desires and pleasures (580d), they can come into conflict (440e), and promote their own interests. The rational part loves wisdom and learning; it is responsible for extending our knowledge and takes pleasure in this (436a, 580d, 581b). It's domain is not just the pursuit of "scientific" knowledge, but also practical deliberation. The spirited part loves honor and winning; it tends towards aggression and competition, but when

⁴² The forms are typically described in dialogues such as the Phaedo, Symposium and Republic as transcendent, perfect archetypes, of which objects in the everyday world are imperfect copies. For example this idea of a universal, a property that more than one thing can have, is a first approximation to the idea of a Form.

⁴³ Plato, The Republic

educated or trained allies itself with reason as aspiration for what is right. (441a, 441e, 442b, 581b) The appetitive part loves food, drink, sex, "and other things which follow from these", as well as money as the means to these (436a, 437b, 437d, 439d, 580d-e). The appetitive part may be capable of means-end reasoning (e.g., it pursues money as a means to its other ends), but it does not deliberate about what is right or good. The virtues of the soul are parallel to the virtues of the city.(441c-444a) For example, a wise soul is one in which reason rules and makes sound decisions for the advantage of the soul as a whole. (442c) A just soul is one in which each of the parts performs its proper function (443d-e); injustice in the soul is "a kind of civil war between the parts (444b).

If such is the nature of the soul and therefore the city such is the way of the Cosmos. A ternary relationship which has already been discussed in this thesis include the production, the control and the intelligence. The TH denotes the university-industry-government relationship as one of relatively equal, yet interdependent, institutional spheres which overlap and take the role of the other. Such is the case with Plato's ideal Republic and the soul of men. The desires and pleasures of each institutional sphere, can come into conflict and promote their own interests. Capitalism is an economic system that is based on private ownership of the means of production and the creation of goods or services for profit. Other elements central to capitalism include competitive markets, wage labor and capital accumulation. As we saw laissez-faire mode of Triple Helix reflects the superiority of markets in a ternary relationship of isolation between the institutional spheres. As Polanyi noted "The idea of a self-regulating economy places limits upon the state and its policy at the same time as a separate political sphere is created because "neither price, nor supply, nor demand must be fixed or regulated but such policies and measures are in order which help to ensure the self-regulation of the market by creating conditions which make the market the only organizing power in the economic sphere".

According to Henry Etzkowitz, Loet Leydesdorff, most countries and regions are presently trying to attain some form of Triple Helix III. The common objective is to realize an innovative environment consisting of university spin-off firms, tri-lateral initiatives for knowledge based economic development, and strategic alliances among firms large and small, operating in different areas, and with different levels of technology, government laboratories, and academic research groups (Etzkowitz and Leydesdorff,2000). We also saw that oscillations between private and State capitalism have taken place in previous century and nowadays Welfare States are pressured by negative integration(at least in Europe) and the dire effects of an economic crisis which further impose implications in terms of national sovereignty and democracy within the gulfs of European Union. But a serious crisis in a "private" sort of capitalism provokes a change to a "state" form of relatively more state intervention strategy and thus a rebalance of the powers that TH denotes. What really makes me wander is whether academia can encompass a third mission of economic development in addition to research and teaching. In other words, what will be the outcome if in the TH Helix model the University institutional spheres will prevail over the others and what does this mean in terms of economic, political and social structures in the Knowledge based Era.

7. Results

Classical liberalism had an enormous impact on the framers of governments. The liberal influence came from several sources, and those who discussed it placed emphasis on different facets of the ideology. From philosophers such as Hobbes, John Locke, Jean-Jacque Rousseau and liberal politicians like conservative Margaret Thatcher, republican George W. Bush, democratic Barack Obama to economists such as classical liberal Friedrich Hayek and Milton Friedman, new Keynesian Paul Krugman all have stretched the importance of markets, free trade, limited government, individual liberties, private property, privatization of nationalized industries and generally enhancing the role of private sector in modern societies. But, is widespread privatization or free trade or the assets dwelled in property a proper mean to increase our liberty? The truth is that individual liberty, selfish, mean, and fictitious promoted by demagoguery on the part of irresponsible politicians can hardly save the day. On the face of this, an anarchist would argue that the problem stems from political power as such and that its existence means that there will be ruler and ruled, masters and slaves, exploiters and exploited. A free social organization, free from governmental intervention, formed by economic associations of the people and brushing aside all the old State frontiers and national distinctions, and having as its basis only productive and humanized labor yet do not exist. Evolutionist Marxian economist Richard Wolff's proposal on the other hand, includes transforming enterprises, internal organizations of production that wants workers inside enterprises to displace their boards of directors and become their own collective boards of directors. Convinced that the serious realization of liberty, justice, and peace will be impossible so long as the majority of the population remains dispossessed of elementary needs, deprived of education, plagued by poverty or lack of essential medicines while there is no Stateless modern Nation on the horizon that an anarchist is dreaming of, the balance that Homo economicus seeks, lies in politics and philosophy as a means to control the State and the markets. A humanized state as opposed to markets or in other words collectivism versus individualism.

In the past Capitalism has been oscillated between two phases most notably known as private and state capitalism. The first phase is characterized by relatively little state intervention; laissez-faire, neoliberal, private capitalist, and conservative have been names for this phase. The other phase exhibits the state intervening relatively more via taxation, regulations, controls and more or less outright ownership and operation of enterprises. Keynesian, welfare-state, state-capitalist, and social democratic have been the adjectives commonly applied in the second phase. In this thesis we saw how individualism is promoted nowadays through economics, politics, law and last through the emergent of the same Welfare State which gave birth to political economy of neoliberalism. Thus the oscillation between state and private sort of things brings also together different politics, philosophy and organizational logic.

The approach to the role of law that States can and should play in development has changed over time globally and this is a result of the dominance of liberal and neoliberal practices and theories. In the past the role of law was to empower the State which was considered as the tool of economic transformation and classic development. The dominance of Keynesian Economics during the last half century is a useful remainder. This orientation on the role of law led to an emphasis on public law and regulation as well as to sweeping legal reforms of traditional economic sectors. The government failures of 70' that presage the shift to the private state of things also meant changing ideas in mainstream economics that led in

almost the opposite direction, as academics and policy makers decided that the state could be a negative force in growth and private actors held the key to robust growth. For Neoliberalism, state efforts to promote growth were likely to prove counterproductive, so the law should be a shield against the state. The enforcement of law underpinning TRIPS agreement sets global minimum standards for the protection of intellectual property. The notion of intellectual property rights is substantially expanding and generates clear gains for the pharmaceutical industry and the developed world with the aim to recoup the investment done and secure the sustainability of R&D process while investment in sensitive areas such as drugs for neglected diseases are treated by reluctance of pharmaceutical industry since profit is not guaranteed. A closer analysis of property rights mobilizations highlights the tensions within concepts such as the public good and private rights and also causes nervousness in terms of disclosure and dissemination of new knowledge and therefore dissemination of new ideas and production of drugs in the case of pharmaceuticals. The more cumulative the use of knowledge, the more social losses will be generated by stronger IP rights. Public health advocates as well as an increasing number of authors from innovation, social or even economic sector argue that the patent protection afforded by the TRIPS Agreement is a significant determinant in establishing pharmaceutical prices and availability. Drugs cost up to date is based on a the estimation of Joseph DiMasi who showed that researching and developing a new chemical or biological entity was estimated at € 1,059 million (\$ 1,318 million in year 2005 dollars) in 2005. The decades old debate over pharmaceutical industry prices profits and innovation seems to be on fire again. Donald W. Light and economist Rebecca Warburton called into question the figure of \$1 billion to bring a new drug to market. In fact, Light and Warburton assert, that figure should be \$55 million median. In any case, it is known that pharmaceutical companies invest only a small friction of their profits in R&D while investment on advertisement seems to be higher in their priorities. Parallel trade implies a conflict between the principle of autonomy of member states to set their own pharmaceutical prices, the principle of free trade and the industrial policy goal of promoting innovative research and development (R&D). According to Scharpf these are the requirements of a negative integration one which supports the rationale of the common market since it promotes a deregulatory or “market-making nature”, that greatly reduces the range of national policy choices and thus, represents a fundamental loss of political control over capitalist economy.

The prevalence of collectivism or individualism in a society relates also to the economic development of the society. The collectivist or individualist character of a society will influence the course of economic development, and simultaneously economic growth and changes in economic structure will alter the orientation of the society toward individualism or collectivism. The notion of Social Capital in this respect can provide a useful guidance on how economic and political reality is shaped. The role of individual characteristics, such as income and education, is determining the stock of social capital in which individuals invest in to obtain influence, social status and access to networks. Whether we speak about economy, politics, law or their institutional reincarnations within societies the prevalence of individualistic approach has resulted in politics which favor free trade, open markets, deregulations in an effort to stimulate markets which supposed to be self-regulating. There is little if no evidence at all after so many years of practicing that they are not. The real question is how if at all privatization of educational systems will bring equal opportunities to the poor compared with that of the rich and what will be the implication in social cohesion in the Knowledge based Era where knowledge creation and

distribution is the primary driver in the process of economic growth, distribution of income, growing networks among firms, and the interface between government business and citizens in the advanced economies. The returns on education investment at aggregate level are correlated with both positive externalities and real wages increases whereas access itself to early learning opportunities has a positive impact on human capital policies that reduce ex-ante inequality, increase the ability to develop and to adopt new technologies (proven impact on health), decrease the social distance between individuals, i.e. they increase social cohesion and are likely to improve economic performance.

Falling government services, falling real wages, falling employment opportunities, immorality, social unrest by widespread privatization of traditional public provisions with direct impact on the well-being of citizens show that, private capitalism is under pressure. The idea behind demand-side economics to stimulate growth, a government should lower taxes on the middle and working class, and increase government spending. To combat rising inflation in an expanding economy, a government should raise taxes and reduce spending. Demand-side economics is often contrasted with supply-side economics, which suggests that cutting taxes on the wealthiest people allows business owners to create more jobs and thus the wealth will pass down from top to bottom. The growing contradictions within the dominant Keynesian world-view clearly pose a great loss of an ally since New Keynesians and Post Keynesians disagree on the income distribution. With regard to income distribution, neoliberalism like New Keynesians asserts that capital and labor (production) get paid what they are worth and promotes labor market deregulation while Post Keynesians argue that income distribution depends significantly on institutional factors and their bargaining power. Moreover, Third Way is in principle inconsistent with the post-Keynesian approach since they faithfully follow conservative perceptions of market forces that emphasizes taxation and regulation as the preferred means of changing private sector behavior rather than prescribing that government take over production through nationalized industries and risk a government failure. At the core of such initiatives is the effort to use state action to empower the private sector.

Austerity measures have shadowed future development of innovation activity in Europe and US while China progress is more than apparent. The modern university is faced with a two-fold challenge: while society presents it with new and growing demands, at the same time the state applies increasingly restrictive policies to the funding of its activities. But the growing pressure to reduce public spending, the emergence of demands arising from other social policies, and the rethinking of the relationship between state and public bodies in general, all put considerable pressure and great obstacles on public funding of universities. Neoliberal political dogma has contributed to the perception of private modern university since individual ability to pay and sole monetary valuation is promoted through the markets with the aim to make them more comparable, flexible, transparent and competitive while issues in terms of accessibility are raised since the load of fees restricts or limits students from their goals and desires.

Comparative state research shows that states may reflect entirely different effects on social structure. Depending on the emergent state most notably known as Corporatist-Statist, Liberal, Social Democratic regime or mediterranean, one may cultivate hierarchy and status, another dualisms, and a third universalism. All were remarkably successful in maintaining full unemployment and promoting economic

growth according to their specific social, cultural and/ or ecological values but each of them is bound to produce its own unique fabric of social solidarity.

The transfer and subsequent application of academic research results has demonstrable benefits for health care, researchers, universities, companies, and local economies. Triple Helix model of innovation evokes a scenario that postulates the incorporation of a third coordination mechanism to the social system in addition to economic exchange relations and political control. According to, Loet Leydesdorff the institutional carriers of an innovation system can be expected to entertain a dually layered network: one layer of institutional relations in which they constrain each other's behavior, and another layer of functional relations in which they shape each other's expectations. Furthermore, it is the market mechanism that first equilibrates between supply and demand and then economic exchange relations can be regulated by political institutions. On the face of this, the implications in terms of social capital remain to be seen as the economic and political reality is shaped from the value of the networks that occur. Thus, the political ideology and thus philosophy accompanied with the role of markets that each political economy evokes will result in different evolutionary process. Wealth generation, novelty generation by organized science and technology and governance of the interactions among these two sub-dynamics by policy-making in the public sphere and management in the private sphere represent the dynamics expected to lead to a higher degree of non-linearity than the bilateral traditional relationship between politics and economy. Up to date, we observe the oscillation between private and state capitalism, however a third coordination and distribution mechanism implies a potential shift to another dimension that of Academia at least whenever it will be ready to accept this challenge.

8. Conclusions

The goal of this thesis is to establish a theoretical framework which promotes a productive social interaction between Governments, Universities and Industry in the case of pharmaceuticals in shaping the patent system. The Triple Helix of innovation implies a radical change of the production of drugs but also of the general political, economic and societal reality. In this respect, the patent system is also under evolution. Patents in the Knowledge based Era can be seen as events within the three social coordination mechanisms, that of wealth generation on the market by industry, legislative control by government, and novelty production in academia. They are both inputs and outputs into an economic system whose purpose is to produce more and more. Up to date their main function is to provide legal protection for intellectual policy but as we know the lack of essential medicines plague the developing world and availability and affordability threatens millions of people.

In response to my research question I support that the Triple Helix of innovation indeed can improve Health Policy and promote Welfare States but it is the very process of evolution of political, economic and societal interactions as well as the international balance of powers that determine the final outcome of such a process. Law, politics and economy are inextricably linked in an ever-ending process which up to date was oscillated between private and state sort of things. The role of law empowers each time the state or the private sort of things as well as their organizational logic. Philosophy and politics are employed to support the State or Private sector according to the challenges of each phase. The role of politics expressed as political traditions/parties and specific welfare state characteristics can explain

to a great extent the variation of health inequalities between States. The TH denotes the Academia-Industry-Government relationship as one of relatively equal, yet interdependent, institutional spheres which overlap and take the role of the other. The notion of social capital can explain the way that social networks as well as their influences do prevail over others. Academia influences the other institutional spheres and it is a matter of time to see the results of this process of co-evolution.

Regarding the TH model of innovation I argue that the notion of TH can be also summoned in the form of a tetrahedron pyramid with corners depicting institutional spheres. This exhibition is based on Pythagorean Tetraktys geometrical application. The polyhedral exhibits structural patterns which in a fundamental sense embody the three distinct sub-disciplines which all together constitute Political Science as such: political philosophy, Comparative politics and international relationships. Modern Physics theoretically accepts the existence of a hyper-tangible universal and real space, as Theology also does (Danezis et al.,2005). Platonism in this sense is justifiable. Do Plato's ideal Republic and Pythagoras' equation of things with numbers evoke scenarios of Triple Helix model of innovation? This is just a personal assumption that has to be further developed. Marx and Schumpeter contribution to political thought has to be taken into account when dealing with forces of "creative destruction" which seek enough resources for a system that tends to self-preservation through the creative forces of production within capitalism and the destruction of capital value as keys to overcome its internal contradictions.

My speculative hypothesis, is that the Triple Helix model of innovation evokes another form of Governance, one in which the role of University will be critical. Given the market and government failures, the active role of University in shaping rescue plans for both is more than vital and central in modern economies let alone the real challenging issues of environmental and health issues. Alternative possible resolutions of the relations among the institutional spheres of university, industry, and government can help to generate alternative strategies for economic growth and social transformation (Etzkowitz and Leydesdorff,2000).

Within this work, I tried to provide normative arguments about the political, economic and societal evolution given the new trends in evolutionary economics. The notion of TH is still under construction and a whim of universal philosophy compatible with new trends in modern Physics and mathematics fits into the logic of model which is bound to bring tremendous changes in our world. Of course a lot of issues still remain to be investigated by fellow researchers. From my part, I am wondering whether Tetraktys geometrical application could result different dynamics in this model since the non-linearity results from helices depiction. Apart from that, through a quantitative analysis someone could create an econometric model with independent variables describing aspects of the three institutional spheres of TH model using various inputs i.e level of Welfare stemming from availability of drugs or prices of drugs, number of patents as well as the level of public disclosure, social determinants of health etc. Lastly, the incorporation of a third coordination mechanism which affects innovation also demands more sophisticated economics that take into account the University functional input into the TH model.

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