How Capitalism, University and Mathematics as Institutions Shaped Mainstream Economics

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Abstract

The article shows that mainstream economics, which now includes such current as new institutional economics, is the result of an evolution shaped by three institutions (capitalism, university and mathematics) by imposing to the profession of economists their founding beliefs. These beliefs are: 'laissez-faire'; 'economic knowledge has a priori and exegetical character'; 'all mathematical entities exist in reality'; 'beauty is a criterion for theoretical constructions'; 'scientific research is a play with axioms and rules of inference'. Because of these beliefs mainstream economics, based on mathematical constructions arbitrarily borrowed from the physics of the nineteenth century, remains cognitively sterile and socially detrimental.

Key words: institution of economics; founding beliefs of institutions; capitalism as an institutional system; institution of university; institution of mathematics (of the discipline of mathematics)

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> I am more interested in economics as a veil that obscures our social understanding than as a technique for discovering how our society works. What does the veil obscure? That the price system is also a system of power; <…> that the object over which the veil is spread is not a collection of individuals but a specific social order to which we give the name capitalism.
>
> (Robert L. Heilbroner 1988: 7 - 8)

> The history of economics suggests that survival has often depended upon the ability of doctrine to fit in with the habits of thought of the times. If the next decade demands formal value theory that avoids a discussion of what the economic order is like, institutional economics will fail. If it demands an understanding of our relationship to the world in which we live, it will survive.
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> (Walton H. Hamilton 1919: 318)

1. Introduction

This article is devoted to an analysis of the birth and evolution of what is now commonly called mainstream economics. I analyse the evolution of mainstream economics during two centuries not as a purely intellectual process inside communities of economists but as a social and political process determined by an embeddedness of economics in such institutions as capitalism and the university, where the institution of capitalism played a decisive role. *Economics itself is considered as an institution, i.e. as particular rules based on certain beliefs that frame the professional activities of communities of economists.* At a later stage of the evolution of institution of economics, it was strongly influenced by the institution of mathematics, i.e. by rules and beliefs that frame the professional activities of communities of mathematicians. The article shows that mainstream economics, which now includes such school of economic thought as new institutional economics, is the result of an evolution shaped by three institutions (capitalism, the university and mathematics), by imposing on the profession of economists their *founding beliefs, i.e. such beliefs that were linked with the birth of the institution or played an important role in its evolution*. These founding beliefs are:

'laissez-faire' (capitalism); 'economic knowledge has a priori and exegetical character' (university); 'all mathematical entities exist in reality', 'beauty is a criterion for theoretical constructions', 'scientific research is a play with axioms and rules of inference' (mathematics).

The destiny of mainstream economics, initially as an intellectual activity and later as an institution, was and continues to be closely linked with capitalism. At the beginning, two Frenchmen, Pierre Le Pesant de Boisguilbert and Anne Robert Jacques Turgot investigated emerging capitalism from the point of view of existing obstacles to its development. They presented a vision of social life as a network of exchanges of commodities between egoistically-oriented merchants. The natural conclusion of their investigations for governmental economic policy of that time was the requirement for 'laissez faire'. The university professor of moral philosophy, Adam Smith, presented their ideas in his *Wealth of Nations* according to the canons of his discipline closely linked with theology. Laissez-faire economists of the 19th century, united in France around the *Journal des économistes* and in England around *The Economist* did not investigate the new born capitalism but, on the basis of selective perception of Smith's ideas, legitimated it and justified the laissez-faire principle. It became necessary because early capitalism generated the so-called 'social question'.

The institutionalisation of economics as a university discipline took place in France, England and the United States at the end of the 19th century as a kind of moral philosophy based on a vision of social life as a network of exchanges (in fact disregarding morality), in contrast to the traditional moral philosophy based on the consideration of society from the point of view of the duties and responsibilities of its members. This kind of institutionalisation was realised under the strong influence of capitalism as an institution, with the growing decision-making power of businessmen in all domains of social life, including university education. The French, British and American universities of the 19th century, with

their Aristotelian understanding of science, had favourable conditions for such institutionalisation.

A different type of economics was institutionalised at the end of the 19th century in German universities, where the understanding of science was not taken from Antiquity and Cartesian modernity, but corresponded to experimental practices in natural sciences. The task of this economics was not to legitimise capitalism with its 'social question', but to find fair and efficient solutions to this question in the framework of capitalism. This kind of economics as a science, and not as a moral philosophy, has been transferred to the United States under the form of Institutionalism, but has been killed by the institution of capitalism ('Academic freedom' trials, selective recruitments and funding).

Economics as a moral philosophy legitimating capitalism and rationalising its negative consequences needed strong justifications to be considered as a 'science'. The best way to do it was its mathematisation. William Stanley Jevons and Léon Walras achieved this by an arbitrary imposition onto social reality of a paradigm taken from an alien field of knowledge, namely mid-nineteenth century physics. Their marginalism was nothing else but a continuation of economics as a moral philosophy (in spite of its mathematical clothes) with its vision of social life as a network of exchanges and its invisible hand of their regulation. The mathematisation of economics was based on the belief that mathematics is a universal scientific language and/or on the belief that 'all mathematical entities exist in reality'. After World War Two a very close interaction between the communities of economists and mathematicians resulted in the adoption by economists of two other founding beliefs shared by mathematicians: 'beauty is a criterion for theoretical constructions' and 'scientific research is a play with axioms and rules of inference'. Because of these beliefs, mainstream economics, based on mathematical constructions arbitrarily borrowed from the physics of the nineteenth century, remains cognitively sterile.

2. The birth of political economy from the point of view of Bruno Latour's and Rom Harré's models of scientific research

Economists continue to consider scientific research using logical concepts of deduction and induction. A recently published article 'concludes that Petty relied almost exclusively on deduction in his scientific approach and that his analysis does not reveal any inductive reasoning' (Ullmer 2011: 1). This kind of consideration is certainly out-of-date (Harré 1994 ; Harré, Gillett 1994). William Petty was a founding member of the Royal Society of London, the cradle of the institution of science. The motto *Nullius in Verba* (demonstration by facts and not by words) has become the rule at the basis of the institution of natural sciences, the most important feature of the scientific culture. Bruno Latour and other specialists of *Science Studies* have investigated this culture and shown that the hypothetico-deductive model never corresponded to the realities of scientific research (Latour 1993). They switched from the discourse around this model to a new model of scientific research, the elaboration of which has been based on historical and field studies of scientific practices in natural sciences (Latour and Woolgar 1979; Latour 1988). The activities of the Royal Society of London represented efforts to collect data in the framework of experimental situations, working out of detailed reports and collective evaluation of obtained results. The reports of the Royal Society served to enlarge the number of witnesses to experiments, and in this way 'to make virtual witnessing a practical option for the validation of experimental performances' (Shapin and Schaffer 1985: 69). One of the key founding members of this society, Robert Boyle, insisted on his 'lack of preconceived expectations, and, especially, of theoretical investments in the outcome of experiments' (Ibid.: 68).

According to Bruno Latour, the specificity of scientific research does not consist in a special 'scientific method', but in the design of experimental situations, in which the object has the possibility to resist, 'to object' to the ideas of the researcher concerning it. Part of the

experimental situation is a recording device assuring descriptions, the core of the experimental work. Latour contests conclusions of 'scientific methodologies' in social sciences which ignore this most important feature of scientific research: 'Unfortunately, although it tastes and smells like hard science, those all-terrain "scientific methodologies" are a sham and a cheap imitation for a reason that becomes clear if we go back to the definition of objectivity, as what allows one entity to object to what is said about it. If we lose the influence of the object in what is said about it, as quantitavists are so proud of saying, we also lose objectivity!' (Latour 2000: 115). It is this property of scientific research which is responsible for such a huge influence of science-based technologies on humanity.

Such works of William Petty as *Political Arithmetic* and *Political Anatomy of Ireland* represent results of a large scale survey in Ireland (McCormick 2009: 84 – 118). The undertaking of this survey provided Petty with the opportunity to examine in microscopic detail the social and economic condition of an entire people and gave him a wealth of empirical knowledge (Aspromourgos 1996 : 11,12). This survey fulfilled in Petty's research the role of a recording device. Petty did his economic research in such a way that more than three hundred years later Latour characterised the work of the social scientist: 'we are in the business of descriptions. Everyone else is trading on clichés. Enquiries, survey, fieldwork, archives, polls, whatever - we go, we listen, we learn, we practice, we become competent, we change our views. Very simple really: it's called inquiries. Good inquiries always produce a lot of new descriptions' (Latour 2005 : 146). For Latour, a descriptive text produced by a social scientist on the basis of close contacts with acting human beings is 'the functional equivalent of a laboratory. It's a place for trials, experiments, and simulations' (Ibid.: 149).

Pierre Le Pesant de Boisguilbert devoted his *Le Détail de la France* primarily to taxes and contributions, as William Petty did with his *Treatise of Taxes and Contributions*. The latter book was written after the completion of the survey in Ireland and was certainly based

on it. The former book contains empirical investigations made by Boisguilbert himself and 'far from being an intellectual perspective or pure speculation, on the contrary, his system arises from lengthy experience and constant contact with practical concerns' (Faccarello 1999: 2). As he wrote himself in one of his letters he "devoted himself to the practice of all the details and knowledge of all parts of the kingdom" (Hecht 1966: 146). In another letter he admitted that he could not fulfill his functions of lieutenant general (civil servant's position) without going into detail in all kinds of commerce and traveling constantly in search of information in the countryside and interrogating every labourer he met. He also collected information by communicating with rich merchants and capitalists (Ibid.:154). Now we would say that he used the technique of interviews. Reading Boisguillebert's book *Le Détail de la France* (1966a), originally published in 1695, one can get the impression that he is reading a report of participant observation following Clifford Geertz's methodology of thick description. It totally corresponds to Rom Harré's model of research in social sciences (Van Langenhove 2010) .

Ontologies	***Locative systems***	***Entities***	***Relations***
Newtonian	Space and time	Things and events	Causality
Discursive	Arrays of people	Speech acts	Rules and story lines

Table 1: *Two ontologies* (Harré, Gillett 1994: 29)

According to Rom Harré, 'if one wants to explain some social phenomena one might say that it was the rule or the convention that made one do it, so that was where the source of causal efficacy in the social world is to be located' (Harré 2002: 118). *Le Détail de la France* is full of descriptions of such rules and conventions. Rom Harré's approach to social sciences is based on a totally different ontology from that inherited from Newtonian mechanics. What we have to investigate in social sciences – and economics is (or should be) a social science - are not things and events but discourses consisting of speech acts. Because social relations are mediated by language, conversations can be considered as primary social reality which has to be studied. Instead of looking for causal relations, social scientists (including economists) have to try to reveal rules and supporting story lines (reflection of beliefs), which together make institutional knowledge. In order to do this 'the experimenter or observer has to enter into a discourse with the people being studied and to try to appreciate the shape of the subject's cognitive world' (Harré, Gillett 1994: 21). The researcher has 'to know what a situation means to a person and not just what the situation is (say, according to a description in terms of its physical characteristics as there are seen by an observer) if we are to understand what that person is doing' (Ibid.). For this kind of research, it does not matter where and even when something was said, but what really matters it is who said it. Institutional knowledge is not universal; it is local. That is why the people contacted should have knowledge linked with the phenomena under study. In this sense 'array of people' means people from a certain appropriate community. At the same time, 'array of people' means a sample from a target community. The choice of the people in the sample and its size are done in a totally different way compared with the mechanistic approach. The researcher contacts people who are willing to share their knowledge. The size of the sample (number of people contacted) is determined by the so-called 'theoretical saturation', when the researcher learns nothing new by contacting additional people from the target community.

Boisguilbert was the first to formulate the principal liberal proposition in terms of economics (Faccarello 1999: 11 -12). The doctrine of *laissez-faire* was born on the basis of objective analysis of early capitalist practices that constantly came up against numerous obstacles. A natural conclusion from this analysis was laissez faire: 'Either it is left to nature, or we create a new mechanism. <…> And since an entirely new, regulated machine is inconceivable, then let all regulation be banished' (Ibid.: 91). Boisguilbert expressed it in his *Factum de la France* telling the well-known story of a meeting between a merchant from Rouen, Thomas Le Gendre, and the Minister of finance Jean-Baptiste Colbert; when the minister asked how the French state could be of service to the merchants and help promote their commerce, Le Gendre simply replied '*Laissez-nous faire*': 'the merchant said that there was a very certain and easy method to put into practice, which was that if he and his ilk [i.e. the ministers and the men in charge of the state] stopped interfering in it [in trade] then everything would go perfectly well because the desire to earn is so natural that no motive other than personal interest is needed to induce action; and that there was only one constant violence, caused by indirect interests, which could destroy this state of affairs and throw the economy into the present state' (Ibid.: 92).

Half a century later, Anne Robert Jacques Turgot in his 'In Praise of Gournay' ('Eloge de Vincent Gournay') reformulated the same idea: 'The general freedom of buying and selling is therefore the only means of assuring, on the one hand, the seller of a price sufficient to encourage production, and on the other hand, the consumer, of the best merchandise at the lowest price' (Turgot 2011: 107). If Boisguilbert based his conclusions on his own empirical investigations, Turgot used for this purpose participant observations of Gournay: 'M. de Gournay was of the opinion that every man who works deserves the gratitude of the public. He was astonished to find that a citizen could neither manufacture nor sell anything without having bought the right to do so by entering a

corporation or guild at great expense, and that, after having bought this right, it was still sometimes necessary to have a law suit, to determine whether by entering this or that corporation he had acquired the right to manufacture precisely this or that article'; 'He had not imagined that in a kingdom subject to the same prince, all towns looked on each other as enemies, that they would assume the right to prohibit work within their precincts to other Frenchmen, classifying them as *foreigners*, to oppose the sale or the free transit of commodities of a neighboring province—and thereby for the sake of some fleeting interest, to contend against the general interest of the State, etc., etc.' (Ibid.: 104, 105). It is in this way that economics linked with laissez-faire belief was born.

3. History of economic thought from the point of view of political science

The previous section of the article was devoted to the birth of economics. Starting from the third section the rest of the article will concern certain episodes of its evolution linked with what we call now mainstream economics. The approach I use in my analysis is the following: the evolution of mainstream economics during two centuries will be studied here not as a purely intellectual process inside communities of economists but as a social and political process determined by its embeddedness in such institutions as capitalism and the university. Economics itself is considered as an institution. I define the notion of institution in the following way: an institution is a set of formal and informal rules, and also beliefs, that stand behind these rules, that orient the behaviour of members of a certain community. Individuals can be at the same time members of several different communities. Formal rules for a community are often the result of compromise with other communities. The informal rules of the behaviour of a community are more linked than formal ones with beliefs shared by members of this community. The most important among these beliefs are those that were linked with the birth of the institution or played an important role in its evolution. I call these

beliefs the *founding beliefs of the institution*. I define the notion of the institutional knowledge of members of a community acting in the framework of an institution as the total sum of knowledge of its members concerning formal and informal rules and beliefs making up this institution.

The rules of the institution of economics relate to university professors and students of economics. These rules provide a framework for developing curricula and syllabi, as well as for the organization of examinations. They define the procedures and directions of economic research, and the criteria for publication of articles in academic economic journals. These rules include formal and informal rules of functioning of professional organizations of economists, such as the American Economic Association. Beliefs that underlie the rules of functioning of the community of academic economists are expressed in different answers to such questions as: What does it mean to undertake economic research? What is the purpose of economic research? What should economists study? How should they carry out the study? In what form should the results of the study be presented? What does it mean to teach economics? What kind of economics should we teach? The answers to these questions, along with formal and informal rules of behaviour based on the answers, altogether constitute the institutional knowledge of professional economists. Candidates for admission to the profession acquire most of this knowledge during the preparation and defense of PhD dissertations that many do in the framework of post-graduate studies. If someone becomes a member of the profession and does not have this knowledge, or refuses to follow its instructions, then sooner or later she/he will be rejected by the profession.

The approach used in this article is similar to the approaches of such interrelated currents of political science as Historical Institutionalism (Steinmo, Thelen, Longstreth 1992), Discursive Institutionalism (Schmidt 2008, 2010) and Constructivist Institutionalism (Hay 2006). Political scientists usually link the birth of historical institutionalism with the

publication of the book of Theda Skocpol (1979). Sometimes representatives of this current are nominated as historical-interpretive institutionalists (Steinmo, Thelen and Longstreth 1992: 7). Theda Skocpol has never felt any respect whatsoever for disciplinary boundaries (Skocpol 1999: 16). Her statement hereafter presented is central to the research made in this article: "Institutions embody ideas. Actually they marry them to resources and patterns of power, social power, and institutions certainly offer definitions of the situation. At the level of political psychology, that explains why people simply are not short-term instrumentalists. They accept definitions of the situation that seem workable and are backed by powerful relationships. People have to deal with such institutionalized definitions of the situation on a day to day basis" (Ibid.: 18). At last Skocpol is willing to study 'what is' and not 'what ought to be': 'I am a social scientist. I believe there is a difference between science and normative work, and good social science is not exactly the same thing as advocacy, though advocacy always benefits from sound scholarship' (Ibid.:19).

Advocates of historical institutionalism pay strong attention to embodiment in the analysis of asymmetries in power relations: 'Historical institutionalists accepted the contention that conflict among rival groups for scarce resources lies at the heart of politics', they found explanations of inequalities that mark national political outcomes 'in the way the institutional organization of the polity and economy structures conflict so as to privilege some interests while demobilizing others'. Historical institutionalists see 'the state no longer as a neutral broker among competing interests but as a complex of institutions capable of structuring the character and outcomes of group conflict' and 'have been especially attentive to the way in which institutions distribute power unevenly across social groups. Rather than posit scenarios of freely-contracting individuals, for instance, they are more likely to assume a world in which institutions give some groups or interests disproportionate access to the decision-making process; and, rather than emphasize the degree to which an outcome makes

everyone better off, they tend to stress how some groups lose while others win.' (Hall and Taylor 1996: 941 - 947)

Discursive Institutionalism has been introduced by Vivien A. Schmidt (2008). Political scientists analyse ideas and discourses in order to explain the dynamic of institutional change or continuity. The 'institutionalism' in this term highlights the fact that this is not only about the communication of ideas or 'text' but also about the institutional context in which and through which ideas are communicated via discourse (Schmidt 2010 : 2, 4). Discursive and historical institutionalism are for the most part complementary. Discursive institutionalism can help historical institutionalism to explain the dynamics of change in historical institutionalist structures through a meaning-based logic of communication and historical institutionalism can help discursive institutionalism to explain the path-dependent regularities of ideas and discourse in different institutional contexts (Schmidt 2008). The institutions of discursive institutionalism are 'simultaneously constraining structures and enabling constructs of meaning, which are internal to "sentient" (thinking and speaking) agents whose "background ideational abilities" explain how they create and maintain institutions at the same time that their "foreground discursive abilities" enable them to communicate critically about those institutions, to change (or maintain) them' (Schmidt 2010:4).

In Constructivist Institutionalism, which has features of both historical and discursive institutionalisms, focus is on the constructed nature of political opportunities structures; on institutional creation and post-formative institutional change; and ideational preconditions of institutional change (Hay 2006: 58 – 59). In this article on the basis of constructivist institutionalism I will consider certain episodes of the institutional history of economics in order to show how the institution of economics was influenced, and in many respects shaped, by three other institutions.

4. On the way to a profession in the service of capitalism

Boisguilbert and Turgot investigated emerging capitalism from the point of view of existing obstacles to its development. They presented a vision of social life as a network of exchanges of commodities between egoistically-oriented merchants. The natural conclusion from their investigations for governmental economic policy of that time was the requirement of *laissez faire*. The university professor of moral philosophy, Adam Smith, presented their ideas in his *Wealth of Nations* according to the canons of his discipline closely linked with theology (Waterman 2004: 88 – 106, 112 - 113). In the United States of the first half of the nineteen century political economy was interpreted 'as a divinely ordained extension of Christian moral philosophy' and 'textbooks welcomed in New England might convey that "invisible hand" was really the hand of God' (Barber 1993: 7). The Smith' work was largely diffused in the French language (Faccarello and Steiner 2002). Jean-Baptiste Say contributed to the spreading of his ideas in France. Capitalism is a complex institutional system with a community of owners and managers of capital as a determinant of this system. The laissez-faire concept is an important belief of most members of this community closely linked with their interests, and can be considered as the *founding belief of the system*. In the nineteenth century, the most influential group in the community of owners and managers of capital became industrialists. It is evident and well known that 'as the strength and power of manufacture grew, industrialists found within the work of Smith and Say a justification for their activities, a validation for their material wealth, and "scientific" support for the principles of *laissez-faire* and government non-intervention' (Sage 2009: 23).

Laissez-faire economists of the nineteenth century, united in England around *The Economist* and in France around the *Journal des économistes*, did not investigate the new born capitalism but, on the basis of selective perception of Smith's and Say's ideas, legitimated it and justified the laissez-faire principle. This became necessary because of the

fact that early capitalism generated the so-called 'social question'. The latter was usually referred to 'everything from working-class poverty to workplace indiscipline to unionization, strikes, and working-class socialist activism' (Ibid.: 3). Preconditions for the social question existed in England already at the time of Adam Smith. In the pits of Durham or Northumberland one could see the following picture: 'Here men and women worked together, stripped to the waist, and sometimes reduced from pure fatigue to a whimpering half-human state <..> children of seven or ten who never saw daylight during the winter months were used and abused and paid a pittance by the miners to help drag away their tubs of coal; pregnant women drew coal cars like horses and even gave birth in the dark black caverns' (Heilbroner 1999: 43). A similar condition existed in factories where 'children, who tended the machines round the clock for twelve or fourteen hours at a turn, cooked their meals on the grimy black boilers, and were boarded in shifts in barracks where, it was said, the beds were always warm' (Ibid.: 44).

To be an 'economist' in Great Britain of the nineteenth century meant the feature of a certain 'social and political culture – hence the foundation and naming of *The Economist* in 1843 as journal to support the cause of Free Trade' (Tribe 2002: 4). Many private clubs, such as 'the Political Economy Club of London, founded in 1821, provided an organisational centre for the discussion and propagation of "sound" doctrines, particularly free trade' (Coats 1993: 402). The character of discourse in England in the middle of the nineteenth century concerning the social question and how it was linked to political economy can be illustrated by some biographic details of one of the central figures in the institutionalisation of economics, Alfred Marshall. Young Marshal could not ignore the existence of the social question and being involved in studying ethics he 'thought that the justification of the existing condition of society was not easy'. One of his friends told him 'Ah ! if you understand Political Economy you would not say that.' (Keynes 1951: 137). In a manuscript, which was

designed for the Preface to the book *Money, Credit and Commerce*, Marshall explained what this friend meant: 'About the year 1867 (while mainly occupied with teaching Mathematics at Cambridge) [I have been in] touch with the question: how far do the conditions of life of the British (and other) working classes generally suffice for fullness of life? Older and wiser told me that the resources of production do not suffice for affording to the great body of the people the leisure and the opportunity for study; and they told me that I needed to study Political Economy' (Ibid.: 138). This was one of the justifications that political economy provided for existing condition of society. Articles published in economic journals and political economy textbooks contained many other justifications. Hereafter are examples of such justifications: 'Since wages were determined by the natural self-regulating mechanism of supply and demand, any attempts to artificially set wages ran the risk of destabilizing the entire market'; 'the workers were miserable because they immediately spent all their money rather than putting it aside for an uncertain future'; 'if the nineteenth-century working class was unable to pull itself up the social ladder as the bourgeoisie had once done it was due to lack of effort, immorality, and ignorance rather than to a *laissez-faire* economic system' (Sage 2009: 15).

The following quotation from a report dated 1864 of the French Minister of Education, Victor Duruy, to Emperor Napoleon III on the creation of the Department of Political Economy at Paris Faculty of Law shows governmental involvement in spreading ideas of political economy as justifications of the existing social order: 'Your Majesty once addressed these words to the national industry exhibitors: "Spread among your workers the sound doctrines of political economy". You, Sir, also claimed that the duty of government is to propagate these necessary concepts, which, according to the English minister of that time, saved England from socialism. This necessity proclaimed by the Emperor fourteen years ago, the country recognizes today. Public opinion demands that unfortunate gap in our general educational system is filled, and several cities have already claimed the opening of political

economy courses' (Dumez 1985: 43 – 44). French political economists saw important opportunity for professionalization of their discipline. In order to get 'scientific status and power' the discipline 'protected itself from unwanted knowledge', 'elevated particular types of knowledge and disqualified others' (Sage 2009: 6).Unwanted knowledge primarily concerned the social question: 'It was industrialists who offered the descriptions of *la question sociale* and proposals for its solution that economists in turn studied, promoted and grafted onto their science' (Ibid.: 7). In order to do it they relied upon fictional 'Adam Smith and Jean-Baptiste Say who they invented' (Ibid.: 19) by ignoring in their teachings everything that contradicted the laissez-faire principle. Their writings were determined by 'their will to defend social order and their fear of socialism' (Sigot 2010: 777).

In the United States, beginning from the mid-nineteenth-century, Christianity inspired both camps of American economists, advocates of laissez-faire and its opponents. I will touch on the Social Gospel movement in the next section, but the opposite movement was finally victorious: 'Members of so-called clerical school of academic economists <…> worked closely with a group of wealthy and prominent men of affairs. Their common goal was the installation of laissez-faire as an American system of economics" (Furner 1975: 37). After the Civil War they continued to develop the mid-century economic synthesis which 'was the joint creation of academics who domesticated English classical economics as a scientific substitute for moral philosophy and American businessmen who needed just such a rationale for the developing industrial economy' (Ibid.: 36). Perhaps the most prominent academic economist issued from the clergy was William Graham Summer. He defended radical laissez-faire as being justified by laws of evolution. Summer wanted to study the economic and social problems of his day scientifically and in Herbert Spencer's *Study of Sociology*, he found the model to follow. After 'resigning his clerical post, Summer became the first occupant of a chair in political economy and social science at Yale' (Ibid.: 43). In this country

'by the mid-1870s laissez-faire economists had consolidated their control of the discipline in the colleges. Economics had become a science of wealth and a useful justification for entrepreneurs who were reaping the fruits of an expanding economy. Prominence as an economist depended on faithfulness to the laissez-faire system, not on training or demonstrated scientific ability <…> laissez-faire was more than a mere test of economic orthodoxy. It was used to decide whether a man was an economist at all (Ibid.: 39 – 40).

5. Two types of universities and the institutionalisation of two types of economics

It seems that historians of economic thought did not pay much attention to the fact that professionalization of economics took place inside universities. Institutions of economics appeared in Europe and the United States in the second half of the 19th century. They were born inside the national institutions of universities. The first universities were created in the 13th century. This is distinct from the birth of the institution of science in the 17th century, which took place *outside* the university. This birth can be linked with the foundation in 1662 of the Royal Society of London for the Improvement of Natural Knowledge. For several centuries, universities did not carry out any research but were purely educational establishments subordinated to the Church and state, *with the task of educating clergymen and civil servants* (Charle and Verger 2007). Up to the 18th century, universities provided education based on ancient Greeks and Romans, as well as on the Bible and theological texts and 'natural sciences were incorporated quite late in British university education, sometimes not until the 1880s (Fourcade 2009: 149). The *founding belief of the institution of universities* was the idea that 'all accessible knowledge is based on certain texts inherited from Antiquity and that any progress in knowledge could derive only from a more detailed exegesis of these texts' (Charle and Verger 2007: 10). The first economist-researcher, William Petty, affiliated to the Royal Society of London, abandoned very quickly his academic career because 'he had

a lifelong antagonism towards the universities, based upon his temperament combined with philosophical convictions which almost inevitably gave rise to a contempt for orthodox learning. The antagonism was at bottom an expression of his commitment to the Bacon-inspired new science' (Aspromourgos 1996 : 11). Similar negative feelings towards universities were felt by a second economist-researcher, Pierre Boisguilbert (Hecht 1966 : 134). It could seem to be a paradox, but it is not, that *mainstream followers of these researchers rely only on conclusions of their research but not on the way they did this research. This deviation* from the initiators of economics was *imposed* on the discipline of economics by two institutions: capitalism and university.

The fact that economics was institutionalised in the institution of universities is crucial for understanding the history of French, English and American economics because in this way the founding belief of the institution of universities influenced very much the economic profession. The separation of science and philosophy that took place with birth of the Royal Society of London did not concern economics in these countries at the end of the 19th century. Economics was proclaimed science but remained a kind of moral philosophy. This moral philosophy was based on the vision of social life as a network of exchanges (in fact disregarding morality), in contrast to the traditional moral philosophy based on the consideration of society from the point of view of the duties and responsibilities of its members. This type of institutionalisation was realised under the strong influence of capitalism as an institution, with the growing decision making power of businessmen in all domains of social life, including university education. The French, British and American universities of the 19th century, with their Aristotelian understanding of science, had favourable conditions for such institutionalisation.

A different type of economics has been institutionalised at the end of the 19th century in German universities, where the understanding of science was not taken from Antiquity and

Cartesian modernity but corresponded to experimental practices of natural sciences with the creation in 1810 of the first *research university* in Berlin. The task of German economics was not to legitimise capitalism with its 'social question', but to find just and efficient solutions to this question *in the framework of capitalism*. This kind of economics as a science, and not as a moral philosophy, has been transferred to the United States under the form of Institutionalism, but has been killed by the institution of capitalism ('academic freedom' trials, selective recruitments and funding). Let's consider the institutionalisation of two types of economics in more detail.

At Glasgow University, Adam Smith taught 'Moral Philosophy, a discipline a great deal more broadly conceived in that day than ours. Moral Philosophy covered Natural Theology, Ethics, Jurisprudence, and Political Economy' (Heilbroner 1999: 42). Smith has not left a textbook of this course but we can judge Moral Philosophy courses of that time in Britain by looking at the manual *Principles of Moral and Political Philosophy* by William Paley (1743 – 1805). Paley lectured at Cambridge University courses on the New Testament and moral philosophy, which subsequently formed the basis of his manual. Now he is best known as a theologian, the author of the book *Natural Theology*. Keynes suggested that Paley was 'the first of the Cambridge economists' (Keynes 1951: 91). Paley's manual *Principles of Moral and Political Philosophy* contains reasoning oriented to justify different types of formal and informal rules in force in Britain. Some parts of this book are devoted to the economic domain, for example property and different kinds of contracts concerning sale, lending of inconsumable property and money, contracts of labour service or labour partnership and so on., and others to civil rights, duties, and the civil government. Altogether the book can be considered as a collection of justifications of the existing social order. Many of these justifications are purely theological. The manual has a special part entitled 'Duties Towards God' and a chapter 'Of the Duty of Civil Obedience, As Stated In the Christian

Scriptures'. Paley admits that the whole system of reasoning in the book justifying different kinds of rules supposes the affirmative answer to the question: 'Will there be after this life any distribution of rewards and punishments at all?' Adam Smith followed the intellectual habit of his time of putting God in the centre of their deductive system. Thinkers of that time consider God as the source of existing regularities in the world. For Newton, the source of nature's regularities was the *Creator*. For Adam Smith, the source of socio-economic regularities was the same; his '*invisible hand*' was the Divine Hand. Antony Waterman, Professor of Economics at the University of Manitoba, on the basis of analysis of the text of *Wealth of Nations*, came to the conclusion that the words 'nature' and 'natural laws' play in this text the same role as the words 'God' and 'Divine Laws' played in traditional theological texts (Waterman 2004: 90 - 95). This substitution allowed Smith to present the social world as analogous to the natural world with its 'natural laws'. *Wealth of Nations* was the first book on economics to catch the public's attention and it started the tradition of mainstream economics in justifying the laissez-faire belief, the founding belief of the capitalist institutional system, formulated first by Boisguilbert and Turgot.

The Smithian economics was taught in American universities: 'The purpose of higher education in pre-Civil War America was to teach piety and discipline. The vast majority of the faculty were involved in preaching and missionary work <…> The first American economics textbooks were written by clergymen, and a religious understanding of economic activity was pervasive. Capitalism and the laws of political economy were thought to be in harmony with the laws of god and consistent with the higher purpose of moral elevation' (Fourcade 2009: 64). In the anticlerical post-revolutionary France Say 'was inclined to utilitarian assessment of religion' and wrote on 'political usefulness of religions' (Faccarello and Steiner 2008: 27, 28). In Britain John Stuart Mill considered Benthamian Utilitarianism as 'a religion; the inculcation and diffusion of which could be made the principal outward

purpose of a life' (Mill 2008: 40). Mill, being agnostic, definitely transferred the legitimacy of political economy from religion to science. He characterised political economy as essentially an abstract science and its method as an a priori method. According to him 'it reasons and must necessarily reason from assumptions, not from facts' (Mill 1994: 56). For him, the model for an abstract science is geometry: 'Geometry presupposes an arbitrary definition of a line, "that which has length but not breadth". Just in the same manner does Political Economy presuppose an arbitrary definition of man' (Ibid.). On the basis of this methodology, mainstream economics takes as its starting point the marginalist revolution, which was the basis for the institutionalisation of economics in Great Britain at the end of the 19th century. Marshall, the central figure in this institutionalisation, developed his vision of economics as a 'science' very similar in its approach to moral philosophy. This type of economics was welcomed by American businessmen who at that time increasingly replaced clergymen on college and university boards of trustees (Coats 1993: 440): 'University leaders (presidents and boards alike) often favoured [economics and other social sciences] as "secular substitutes for religion" and saw in them a continuation of the old courses in moral philosophy' (Fourcade 2009: 66). In this way capitalism, together with the institution of the university began to shape the institution of economics which led the profession of economists to present-day mainstream economics.

The link between scientific research and universities was first created in Germany at the beginning of the 19th century with the reforms of Wilhelm Humboldt, started in 1810 in the newly created University of Berlin. This university became the first so-called research university, i.e. research and educational establishment at the same time. University professors were invited, and even obliged, to do their research inside the universities. Humboldt's concept considered science not as something accomplished that teachers should transfer to students, but as 'a problem which has not yet been solved' and the search for its solution

should be unceasing. According to him 'the university teacher is therefore no longer a teacher and the student no longer someone merely engaged in the learning process but a person who undertakes his own research, while the professor directs his research and supports him in it' (Humboldt 1903–36, vol. XIII: 261). German academic economists of the second half of the 19th century followed natural sciences research tradition with their experimental method. They were affiliated neither with Smithian nor Marxian economics, which were based on Mill's methodology with its a priori method. Both the scope and method of German economics were different from the economics of Smith and Marx. In the scope of their analysis there were not only quantitative variables such as production, consumption, labour, values, prices and capital, but, above all, qualitative entities: institutions; i.e. rules and beliefs. Gustav Schmoller, the leader of German economists at that time wrote: 'The present-day economics (Volkswirtschaftslehre) has come to a historical and ethical conception of the state and society, quite different from that which had been formulated by the rationalism and the materialism. It is no longer a mere theory of market and exchange, a kind of political economy of business, which threatened to become a class weapon of the wealthy. It became once again a great political and moral science, which studies production of goods but also their distribution, the phenomena of exchange, but also economic institutions. It puts again the man in the centre of science, rather than goods and capital' (Schmoller 1998: 202 - 203).

Schmoller and his colleagues based their research on the assumption that 'major sources of social regularity were common morals, ethics, and institutions' (Grimmer-Solem 2003: 160). Thus, to understand socio-economic phenomena it was necessary 'to study all those institutions that had emerged over time to constrain and mould individual behaviour into purposive action and social interaction' (Ibid.). This kind of study could be nothing more than an analysis of talks and texts of actors. Schmoller believed that economic and social science had the same epistemology as natural science, with the distinction that it should be

hermeneutic. The discursive/hermeneutic stance of German economists of the 19th century had come into being under the influence of Wilhelm Dilthey, whose *Introduction to the Human Sciences* was highly rated by Schmoller (Schmoller 1998: 175 – 183). German economists did their research collectively: They were organised in a Union for Social Policy (*Verein für Sozialpolitik*), a research body with the objective of providing scientifically derived information for politicians, the public, legislators and government officials, who would then use this 'scientific' information as a basis for policy decisions, and thereby not blinded by the fog of 'partisan economics' (Grimmer-Solem 2003: 179). Founders of this Union shared their general frustration with the mode of reasoning of classical economics 'that seemed wholly at odds with the positivist and materialist scientific climate of the time when the natural sciences were celebrating success upon success by working empirically' (Ibid.:123). Thanks to this Union in the community of German economists, good professional practice became identified with empirical research. The Union guided and organised economic research by its agenda-setting standing committees of annual conferences. These conferences were not just meetings of members of the profession sharing with each other results of their research. These conferences were places of debate of *commissioned studies*: 'In advance of conferences, the Union's standing committee held meetings to nominate and vote on the subjects to be discussed at the conferences. Sets of questions were then raised and parameters set for research and fieldwork (or in the case of surveys, detailed questionnaires were drafted and sent out) by a commissioned expert, and increasingly, groups of experts. The results of these investigations and surveys would then be compiled into summary studies which were circulated before conferences <…> Following the conferences, commissioned studies were published in the Union's monograph series' (Ibid.: 69 -70). We can say now that the activities of the Union for Social Policy were in many respects similar to the activities of the Royal Society of London: members of the Union and Society collected data in the

framework of experimental situations, working out of detailed reports and collectively evaluated them. The German institution of economics, with this Union as its integral part, was created under the leadership of Schmoller, collaborating very closely with Bismarck government.

In the United States, the institution of economics under the form of Wisconsin Institutionalism was in many respects similar to the German one. The role of Schmoller was played by John R. Commons who saw the sources of socio-economic regularities in law and ethics (Commons, 1934b). He collaborated very closely with the administration of the governor/senator of the state of Wisconsin, Robert La Follette. In Wisconsin, the German model has even been improved: in addition to historical and monographic research, researchers began to use a technique which was later called Action Research. It was done under the auspices of the Wisconsin Industrial Commission, which served as a laboratory for the Commons' group where they did their investigations. Richard Ely, initially teacher and later boss of Commons, is now known almost exclusively as the founder of the American Economic Association. It is not widely known that Ely and his colleagues, who obtained PhD degrees in economics in Germany, wanted to create an American version of the Schmollerian Union, but they had failed to do so because of the strong resistance they met. Ely transmitted to Commons the Schmollerian method of research which included, as a central element, direct contacts with actors and the Humboldtian method of university teaching; that is the involvement of students in the research process. Ely has witnessed: 'He [professor Commons] kept in touch, on one hand, with labour and, on the other, with the management of industry. He mingled with all classes of people. He introduced to his classes people <…>, who were regarded as very dangerous radicals. To him, these people were simply human representatives, whom his students should know face to face. On the other hand, he was just as eager to have his classes know capitalists and leaders of industry. He could admire a labour

leader; he could understand the slugger; and he had a great admiration for the big industrial leaders. In order to understand their point of view, he became a member of the Wisconsin Industrial Commission, while on a leave of absence from his university duties' (Ely 1938: 187 – 188). As Philip Mirowski wrote: 'Many of the economic functions of the US government that we take for granted today were the handiwork of Commons and his students in the first half of the twentieth century' (Mirowski 1987: 1027). John Commons called interviewing 'the prime method of investigation' (Commons 1934a: 106). He made case studies of the past and present. In Wisconsin University Commons offered a course based mainly on the study of reported legal cases, involving a correlation of law, economics and psychology. He wrote: 'Academic teaching is merely brains without experience. The 'practical' extreme is experience without brains. One is half-baked philosophy – the other is rule-of-thumb' (Commons 1934c: 160).

At the end of the19th century many young American economists received their PhD degrees in German research universities. It was a time when a hostile coexistence between theology-like and research-oriented currents of economic thinking, with its origins in Germany, was yet possible in American universities. The institutionalisation of American economics had just started and punitive sanctions from outside of the profession were necessary to orient it in favour of the owners and managers of capital. As A.W. Coats indicates, 'it is easy to understand why the shift of emphasis from teaching of established truths to the advancement of knowledge and the investigation of current problems was liable to generate frictions between the social scientists and certain segments of their audience (Coats 1993: 439). He explained these frictions in the following way: 'The late nineteenth century was a time of disturbing economic, social, and political tensions, and the fact that the business community was generally getting a bad press when the economists were undertaking more thorough studies of their activities increased the likelihood that even the most objective

and impartial enquiries would furnish ammunition for the innumerable critics of contemporary capitalism <…> Laissez-faire and conservative social Darwinism were still the ruling beliefs among members of the social and business elites, whereas many of the younger social scientists were reformers who regarded uninhibited individualism and unfettered competition as the cause of many , if not most, current economic and social evils' (Ibid.: 439 – 440). Academic freedom was trampled: 'During the wave of academic freedom cases that spanned from the 1890s to the 1910s, many economists came under sharp public attack for promoting views that offended powerful constituencies in matters as varied as the labour movement, free silver coinage, public utility franchises, or fiscal policy' (Fourcade 2009: 79). The profession of academic economists 'became increasingly accountable to external control (such as boards of trustees and university administrators, or state legislatures in the case of public universities) <…> The turn-of-the-century political attacks against progressive social scientists set the limits of acceptable behaviour and drove them to confine their scholarship to "safe" intellectual ground' (Ibid.). Neoclassical economics especially in its mathematical form in this period 'was ideal for serving such ground. That is the reason why it became an 'attractive research strategy by American economists, especially by the younger generations who had to create a position for themselves' (Ibid.: 79 – 80). This is a very clear description of the shaping of the institution of economics by the institutions of capitalism and university.

Economists such as Richard Ely and John Commons did not share the laissez-faire belief, they opposed to it a Christian one. One of the factors influencing the institutional evolution of the discipline of economics in the United States was the demise of the Social Gospel movement and the use of the image of science to legitimate conservative opinions (Bateman 1998). The discourse of the Social Gospel movement concerning religion, social justice and welfare was substituted by the discourse of conservative economists about science, efficiency, and free enterprise. The role of advocates of the Social Gospel movement in economics was

important: ‘Not all American economists in 1920 would have happily identified with the whole range of Ely’s and Commons’s work <…> but in the glow of the Social Gospel’s golden years, historical and institutional approaches were accepted and respected” (Ibid.: 41). Acceptance and respect disappeared, or at least decreased, with the switch from the image of science as an experimental activity to a purely theoretical one, in which just the fact of using mathematics already signifies its scientific character: “Whereas institutional economics seemed perfectly ‘scientific’ in 1922, by 1947, it was no longer unquestionably regarded as such’ (Ibid.: 48). Academic freedom in the case of the discipline of economics is very relative: ‘During the twentieth century, there have been primarily four patrons of economics: higher education, the government, the business community, and charitable foundations’ (Goodwin 1998: 54). Practically all of them contributed, including by selective financing, to the gradual diminution of the weight of any current of economic thought different from neoclassical and considered as troublemaking (Ibid.: 78 – 79).

As is well known, after World War Two, Friedrich Hayek contributed to the ascent of laissez-faire by the foundation in 1947 of the Mont Pèlerin Society. He invited scholars, mostly economists, with some historians and philosophers, to meet at Mont Pèlerin, Switzerland, to discuss the state, and possible fate of classical liberalism and how to combat the ‘state ascendancy and Marxist or Keynesian planning [that was] sweeping the globe’. ‘The international academy Hayek sought was actually designed to create a space where like-minded people who shared philosophical ideas and political ideals could mingle and engage in a process of further education and collective learning dedicated to advancing a common neoliberal cause. The effort of the incipient neoliberal thought collective led to the creation of a *comprehensive* transnational discourse community’ (Mirowski and Plehwe 2009: 5). Hayek remained as president of this society until 1961, and in 1974 he was awarded The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel, founder of the Nobel

Prize. Usually it is called 'Nobel Prize in Economics', but in reality it has nothing in common with the testament of Alfred Nobel according to which 'prizes [should be awarded] to those who, during the preceding year, shall have conferred the greatest benefit on mankind'. We can even suppose that the most eminent promoters of laissez-faire were awarded with this prize for their activities as presidents of the Mont Pèlerin Society (Friedtich Hayek: president 1947-61, Nobel Prize 1974; Milton Friedman: president 1970-72, Nobel Prize 1976; George Stigler: president 1976-78, Nobel Prize 1982; James M. Buchanan: president 1984-86, Nobel Prize 1986; Gary Becker: president 1990-92, Nobel Prize 1992). I do not think that courses on the history of economic thought should present the teachings of these persons as just pieces of intellectual history as Bruce Caldwell does with an evident admiration for Hayek (Caldwell 2004); 'the key to understanding the turns and reversals in his thought lay in his politics, and not as Caldwell has it, in some abstract philosophical doctrines' (Mirowski 2007: 351).

All this led to the situation characterised recently by Joseph Stiglitz: 'Economics has moved – more than economists would like to think – from being a scientific discipline into becoming free market capitalism's biggest cheerleader. If the United States is going to succeed in reforming its economy, it may have to begin by reforming economics' (Stiglitz 2010: 238).

6. Mathematisation of economics and three beliefs of mathematicians

From the very beginning of its existence, mathematics appeals to the ontology which is called in the Table 1 Newtonian Ontology. With its orientation towards space and time, things and events, and causality, mathematics is not at all suited to any deep research in social sciences. In their recent book George Akerlof and Rachel Kranton acknowledge that quantitative studies oriented to the identification of causality are useful, 'but they may only hint at what we really want to know' (Akerlof and Kranton 2010: 117). They suggest that economists

undertake an ethnographers' style of research: 'From the many details they record, and the attention they give to the subtexts of what people say, they construct a consistent picture of the people's behaviour. Indeed, the very best ethnographic studies do not just record what people say; they decode what people say and do' (Idem.: 116 - 117). It is exactly in this way that Boisguilbert started economics by, in one way, imitating the experimental practices of natural sciences, and, in another way, transforming them for the needs of social research. This kind of transformation was impossible in the application of mathematics to economics because of its ontological inadequacy.

Application of mathematics in economics was and continues to be a realisation of Descartes' error (Damasio 2005) and Descartes' dream (Davis and Hersh 1990). Descartes was a real personification of the Enlightenment: 'Cartesianism destroyed the balance which underlies true science: the balance between thinking and observing, deduction and induction, imagination and common sense, reflection and action, reason and passion, abstract thinking and realism, the world within and the world without the mind. Under the impact of Cartesianism the second element of the equation was sacrificed to the first <...> Descartes' epistemological reflections opened an era of axiomatic, unhistorical, deductive thinking broadly called the Enlightenment' (Mini 1994: 39). The Cartesian dualism with its separation of knowing from doing, object from subject, fact from value, theory from practice serves an epistemological foundation for neoclassical economics (Bush 1993: 65). Systems studied by economic science are never simple and that is why a priori theories do not have any chance to serve as a basis for the understanding of economic phenomena. No testing of this kind of theories would help: 'Cut off from observation as a *source* of truth, the Cartesian mind puts great emphasis on 'testing' to reaffirm its realism. But testing is not a guarantee of correct ideas because, having lost its mooring in reality, the economic mind has created so many

conundrums, puzzles and purely mental constructs that testing proves everything and nothing' (Mini 1994: 41).

Nicolas de Condorcet was certainly a Cartesian in its 'Social Mathematics' (Feldman 2005), but he was able to understand that mathematical language can be '"very far from leading to more precise ideas". He explains, more generally, that "quantity of the universal commodity (i.e., money), or of some particular commodity, can be considered as numbers. The economic sciences are indeed quantitative in this sense. But "the desire to buy and the desire to sell are not susceptible to any calculation, and yet variations in price depend on this moral quantity, which itself depends on opinions and on passions"' (Rothschild 2001: 175 – 176). Condorcet shared the economic views of Turgot (Ibid.: 84) but did not create a mathematical version of his economic theory. It is Augustin Cournot who is considered as the first mathematizer of economics. The question arises why the mainstream mathematical economics did not follow Cournot but Walras and Jevons? We can conclude from the third section of this article that the answer is very simple: because Cournot in his writings was not advocate of laissez-faire (Sigot 2005). Economics as a moral philosophy legitimising capitalism and rationalising its negative consequences needed strong justifications to be considered as a 'science'. The best way to do it was its mathematisation. William Stanley Jevons and Léon Walras made this work. As I already told in the Introduction, their marginalism was nothing more than a continuation of economics as a moral philosophy (in spite of its mathematical clothes) with its vision of social life as a network of exchanges and its invisible hand of their regulation. The general equilibrium theory of Walras with its independent egoistically oriented individuals making exchanges on the basis of equilibrium prices could be easily interpreted as a continuation of theoretical constructions of the political economy of the 19th century at the service of capitalism (see Section 3 of this article).

The British universities channelled the institutionalisation of economics towards its mathematization because ‘mathematics [considered as a heritage of Antiquity] throughout the nineteenth century reigned at Cambridge as a fundamental component of the prestigious tripos examination system’ (Fourcade 2009: 149). In this intellectual atmosphere, it is the connection of a discipline with the mathematical method, and not with the experimental one, which was the decisive sign of the truly ‘scientific’ character of the discipline. In order ‘to merit’ this indication, British economists were oriented towards ‘the progressive elimination of most inductive and historical elements from the core of political economy, and concomitant ascendancy of the deductive method’ (Ibid.). Alfred Marshall stood at the origins of the modern institution of economics. This institution has been founded by usage of Jevons’ and Walras’ ideas. In spite of the fact that in his *Principles of Economics* Marshall put all mathematical formula in the appendix we can without any doubt say that his economic reasoning was mathematical. This direction of the institutionalisation of economics was very closely connected with the *first founding belief of the community of mathematicians* expressed by Galileo: ‘Philosophy is written in that great book which ever is before our eyes - I mean the universe - but we cannot understand it if we do not first learn the language and grasp the symbols in which it is written. The book is written in mathematical language, and the symbols are triangles, circles and other geometrical figures, without whose help it is impossible to comprehend a single word of it; without which one wanders in vain through a dark labyrinth” [quoted in (Burtt 1954: 75)]. This belief takes the following form in mainstream economics: ‘Samuelson’s signature method of economic theory, illustrated in his *Foundations* (1947), seems to follow two rules which can also be said to characterize much of Neoclassical economics since then: With every economic problem, (1) reduce the number of variables and keep only a minimum set of simple economic relations; and (2) if possible, rewrite it as a constrained optimization problem’ (Samuelson and Barnett 2007: 144). By modelling

economic agents in this way, he hoped to be able to predict their behaviour in much the same way that physicists predicted the behaviour of physical objects' (Szenberg, Gottesman and Rarattan 2005: 21).

As was brilliantly shown by Philip Mirowski, neoclassical economics has its mathematical origins in thermodynamics: 'The supposed mystery of the "simultaneous discovery" of neoclassical economics in the 1870s and 1880s is dispelled when it is realized that energy physics has filtered down to some textbooks by the 1860s, and is rapidly becoming the primary metaphor for the discussion of the physical world' (Mirowski 1989: 217). The formulation of neoclassical theory in the 1870s was just a 'metaphorical appropriation of the analytical structure of mid-nineteenth century physics. 'Neoclassical economics is thus seen not as a "discovery", but as an arbitrary imposition onto social reality of a paradigm taken from an alien field of knowledge' (Carlson, 1997: 741). Paul Samuelson continued this *metaphorical practice*. His working method was the same: to reproduce the application of mathematical methods in physics to economics. Samuelson was not a physicist but he 'had an acquaintanceship with scores of leading world mathematicians and physicists' and received 'essential hints' for his work from a thermodynamicist (Samuelson and Barnett 2007: 155).

What attracted those who mastered and loved mathematics to economics? I suppose it was, and continues to be, the ease with which they can be more highly valued in the profession of economics than in the profession of mathematics. Because of the tradition, coming from the University of Cambridge, of considering the application of mathematics as a summit of 'scientificity', it was very attractive to enter the scientific community via economics with more chance of succeeding and with far less effort than would have been required in mathematics or physics. Once Samuelson said: 'I became an economist quite by chance, primarily because the analysis was so interesting and easy' (Szenberg, Gottesman and

Rarattan, 2005: 33). It was as easy ‘as fishing in a virgin Canadian lake. You threw in your hook and out came theorem after theorem’ (Samuelson and Barnett 2007: 154). In my opinion, it was the comparative *easiness* of Samuelson’s version of working on papers for professional journals *and* teaching their type of economics which was one of the important causes of the final victory of their line of economic thought over interpretive/historical/discursive institutionalism in economics. The interpretive/historical/discursive institutionalist version of teaching economics, by the involvement of students in research concerning burning socio-economic-political problems, requires much more effort by professors than just repeating, with no very great changes, quite simple mathematical constructions and supervising solutions by students of numerical examples illustrating these constructions. Those university graduates with a good mathematical background who are looking for a job valorising their mathematical skills could be very much attracted by the profession of academic economists in its neoclassical version.

After World War Two a very close interaction between the community of economists and that of mathematicians (Weintraub 2002) resulted in the adoption by economists of two other founding beliefs shared by mathematicians. Their *second founding belief is* the aesthetic character of mathematics (Sinclair, Pimm, Higginson 2006). It is a very important element of the mathematical culture (Hersh and John-Steiner 2011: 46 – 47): ‘Everyone agrees that mathematics can, should, or even *must*, be beautiful. But it is not so easy to explain just what you mean by beautiful mathematics. What patterns, proofs and discoveries do mathematicians call beautiful?’ (Ibid.: 47). Hereby is an authoritative witness: ‘Mathematics, rightly viewed, possesses not only truth, but supreme beauty — a beauty cold and austere, like that of sculpture, without appeal to any part of our weaker nature, without the gorgeous trappings of painting or music, yet sublimely pure, and capable of a stern perfection such as only the greatest art can show. The true spirit of delight, the exaltation, the sense of being more than

Man, which is the touchstone of the highest excellence, is to be found in mathematics as surely as poetry.' (Russell 2011: 60). The consequences of this belief of mathematicians transferred to the community of economists were disastrous. Paul Krugman expressed it in the following way: 'As I see it, the economics profession went astray because economists, as a group, mistook beauty, clad in impressive-looking mathematics, for truth' (*The New York Times*, 2 September 2009).

The *third founding belief* of the majority of the mathematicians coming from David Hilbert, and reinforced by Nicolas Bourbaki, is the opinion that mathematicians must not care about the links of mathematical constructions with reality they have to deal exclusively with the internal logic of mathematical structures themselves (Leonard 1997). Philip Davis and Reuben Hersh, on the basis of their interviews with mathematicians and participant observation inside their community, produced a generalised image of the Ideal Mathematician. The authors conventionally called the topic of this imaginary mathematician 'the theory of non-Riemannian hypersquares'. This problem has acquired great prestige just because 'the best non-Riemannian hypersquarers have worked on the problem, obtaining many partial results'. Our Ideal Mathematician is not very much interested in application of his work outside of mathematics: 'I've been told that some attempts have been made to use non-Riemannian hypersquares as models for elementary particles in nuclear physics. I don't know if any progress was made'. He is not concerned about the connection of what he is doing with reality: 'I never thought hypersquares existed. When I say they do, all I mean is that the axioms for a hypersquare possess a model. In other words, no formal contradiction can be deduced from them, and so, in the normal mathematical fashion, we are free to postulate their existence. The whole thing doesn't really mean anything, it's just a game, like chess, that we play with axioms and rules of inference'. Today mathematics as a discipline is totally self-referential: 'How could we as mathematicians prove to a sceptical outsider that our

theorems have meaning in the world outside our own fraternity? If such a person accepts our discipline, and goes through two or three years of graduate study in mathematics, he absorbs our way of thinking, and is no longer the critical outsider he once was. In the same way, a critic of Scientology who underwent several years of "study" under "recognized authorities" in Scientology might well emerge a believer instead of a critic' (Davis and Hersh 1981: 34 – 44).

This kind of mathematics has emerged under the influence of a group of French mathematicians who published their books under the pseudonym Nicolas Bourbaki. They tried to present the whole of mathematics on the basis of axiomatic method which they understood in the following way: 'The axiomatic method is, strictly speaking, nothing but this art of drawing up texts whose formalization is straightforward in principle. As such it is not a new invention; but its systematic use as an instrument of discovery is one of the original features of contemporary mathematics. As far as reading or writing a formalized text is concerned, it matters little whether this or that meaning is attached to the words, or signs in the text, or indeed whether any meaning at all is attached to them; the only important point is the correct observance of the rules of syntax.' (Bourbaki 1968: 8). E. Roy Weintraub and Philip Mirowski have brilliantly shown 'how the Bourbakist school of mathematics rapidly migrated into neoclassical mathematical economics. Crossing this disciplinary boundary established, for economists, the imposing edifice of Walrasian general equilibrium theory, the landmark of high theory in economics for the next four decades' (Weintraub and Mirowski 1994: 246). It was Gerard Debreu, trained in France by a member of Bourbaki group, who was 'transoceanic gemmule' of Bourbakist-inspired applied mathematics that 'took root and flourished in the postwar American environment' (Ibid.: 248). The 'seedbed' for this kind of economics was the Cowles Commission, many collaborators of which have come to it from physics (Ibid.: 249). Bourbaki's purity of axiomatic approach and their isolation from other

disciplines ‘has drawn the wrath of many natural scientists’ ; ‘for many scientists, Bourbaki became the watchword for the chasm that had opened up between mathematics and its applications, between “rigor” and its alternative homeostat, the dictates of the concrete problem situation’ (Ibid.: 248). According to Weintraub and Mirowski, ‘Debreu intended his *Theory of Value* to serve as the direct analogue of Bourbaki's *Theory of Sets*’, ‘in Debreu's interpretation, general equilibrium theory thus loses its status as a “model” to become a selfsufficient “formal structure”. The objective was no longer to represent the economy, whatever that might mean, but rather to codify the very essence of that elusive entity, the Walrasian system’ (Ibid.: 265). The Nobel Prize in Economics Committee announced in its press release that Gerard Debreu has proven that ‘the market works automatically’ and after 1983 ‘it was for this reason that he insisted on the strict separation of mathematical form and economic content, excusing himself with a voice of guilt: “Sorry, I did not mean that”’ (Düppe 2010: 30).

The consequence of the third belief of mathematicians transferred to economists is a ‘fairy tale’ nature of mainstream economics: ‘I believe that as an economic theorist, I have very little to say about the real world and that there are very few models in economic theory that can be used to provide serious advice’ (Rubinstein 2006: 881). Can you imagine that, for example, Werner Heisenberg could say something similar? However the author of this declaration is not a marginalised member of the community of academic economists, but its very honourable member: the text is part of his Presidential Address to the Econometric Society made in 2004. In this paper-confession, he continues: ‘As economic theorists, we organize our thoughts using what we call models. The word “model” sounds more scientific than “fable” or “fairy tale” although I do not see much difference between them’ (Ibid.).; ‘What are we trying to accomplish as economic theorists? We essentially play with toys called models. We have the luxury of remaining children over the course of our entire

professional lives and we are even well paid for it. We get to call ourselves economists and the public naively thinks that we are improving the economy's performance, increasing the rate of growth, or preventing economic catastrophes. Of course, we can justify this image by repeating some of the same fancy sounding slogans we use in our grant proposals, but do we ourselves believe in those slogans?'(Ibid.: 865).

One of the greatest mathematicians of the 20th century Vladimir Arnold opposed Bourbakism and criticised the trend of high levels of abstraction in mathematics. According to him it had a negative impact on French, and then later other countries' mathematical education. He spoke about the danger of fetishising theorems in modern mathematical textbooks: 'I even got the impression that scholastic mathematicians (who have little knowledge of physics) believe in the principal difference of the axiomatic mathematics from modelling which is common in natural science and which always requires the subsequent control of deductions by an experiment' (Arnold 1998: 232). One of the Arnold's papers entitled "Mathematical Epidemics of the 20th century" begins with the sentence: 'Modern formalized education in mathematics is dangerous for all mankind' (http://www.mccme.ru/edu/index.php?ikey=viarn_mat_epidem). Bourbakism has strongly influenced mainstream economics which, as the crisis which started in 2007 demonstrated, is certainly also dangerous for all mankind.

7. Conclusion: institutional approach in economics and towards economics

The author of this article practiced an institutional approach in economic research (Yefimov 2003) and also in order to understand the functioning of the economic profession (Yefimov 2010). In both cases it was an approach that is called by political scientists historical/interpretive/discursive institutionalism, or more generally constructivist institutionalism. This approach requires direct contacts with members of communities under

study: in the first case they were Russian agrarians and in the second case – European, American and Russian economists. These direct contacts were made through participant observations and interviews. Boisguilbert was the first constructivist institutionalist, followed by Schmoller and Commons.

Schmoller's *Verein für Sozialpolitik* included many members who were not academics but administrators. German economists worked in very close contact with practical men. On the contrary, the British community of academic economists followed the tradition of distancing from the latter. Ricardians already had as the source of their influence 'their claim for scientific authority which they strenuously asserted in books, pamphlets, magazines, newspapers, official enquiries and parliamentary debates' (Coats 1993: 402). In their aspiration to look like 'scientists' 'the most distinctive feature was their effort to distance themselves, as experts, from the amateurs, especially despised "practical" men' (Ibid.) James Mill, father of J.S. Mill, has formulated it in the following way: 'a reasoner must be hard pressed when he is driven to quote practical men in aid of his conclusions. There cannot be a worse authority, in any branch of political science, than that of mere practical men' (Ibid.). British political economists of the 19th century tried to simulate the behaviour of natural scientists in a very superficial way by distancing themselves from 'non-scientists', but ignoring the most important feature of their behaviour: experimental contact with the object under study. They did not realise that 'practical men' for many types of information are the only sources available. Practical men are elements of the objects of study and not being in contact with them for those who work as scientists in socio-politico-economic domains means to work with 'switched off recording devices'. In the domain of natural sciences it would mean the end of the profession of scientific researcher.

To my mind the attractiveness of the German school of thought comes from the fact that it produced such a rich set of ideas concerning the social world that they continue to reappear

later. One of its central ideas has been incorporated into the Social Constructivism: 'Institutions always have a history, of which they are the products. It is impossible to understand an institution adequately without an understanding of the historical process in which it was produced' (Berger and Luckmann 1991: 72). That is why in both my studies direct contacts with members of communities under study were supplemented by historical analysis. Historical/interpretive/discursive institutionalism overlapping with social constructivism represents either a social sciences' approach or some kind of social sciences' frame theory. It is this approach that I am using in this paper for the analysis of economics. Two central questions which I try to answer in this paper are why German economics has disappeared and English economics expanded on a tremendous scale. The key to understanding it gives the social constructivist connections between institutionalisation and social control: 'Institutions, by the very fact of their existence, control human conduct by setting up predefined patterns of conduct, which channel it in one direction as against the many other directions that would theoretically be possible. It is important to stress that this controlling character is inherent in institutionalisation as such, prior to or apart from any mechanisms of sanctions specifically set up to support an institution' (Ibid.). Constructivist institutionalism underlines the connection between institutions and ideas/beliefs. No institution can exist without the idea/belief connected with it. It was almost always *the belief which was linked with the birth and evolution of the institution*. I call these beliefs *founding beliefs.* We have seen that institutionalisation of economics in Germany in the second half of the 19th century has been very closely linked with the idea shared by natural scientists that *scientific knowledge is an experimentally based knowledge*. Social control in the community of natural scientists is finally a *control of the veracity of reports concerning conclusions based on data gathering and experiments*. The belief which was linked with *the birth of the institution of British economics was absolutely different*. It is the idea expressed by John

Stuart Mill that economics cannot use experimental methods and should use the *a priori method.* I think now it is time to reconsider *Methodenstreit.*

Bruno Latour, quoted in the first section of this article, was not the only one to investigate the activities of researchers in natural sciences. The world of high energy physics was studied by Sharon Traweek (1988). A comparative investigation of the activities of researchers in the domains of high energy physics and molecular biology has been made by Karin Knorr Cetina (1991, 1999). The latter comes to the same conclusions as Latour concerning 'the resistance': 'Molecular geneticists do interact with "the world" – as it is featured in the laboratory of course, but this featuring does not preclude but rather enhances resistance. They constitute part of a behavioral system in which "things" are not passive receivers but active reactants' (Knor Cetina 1991: 119 – 120). At present most economists consider economics as theory or theories. To do economics mean for them to develop or to apply theories. According to Knorr Cetina 'much of laboratory science in molecular genetics neither directly draws upon, nor it seems terribly involved with establishing, theoretical representations. In molecular genetics, theoretical statements may indeed be post hoc "representations" of materials' (Ibid., p. 120). Apparently neither Latour nor Knor Cetina would agree with Milton Friedman's famous statement: 'A theory is the way we perceive "facts", and we cannot perceive "facts" without a theory' (Friedman 1953: 34). Some sincere mainstream economists do not agree with Friedman either: 'By regularities I mean phenomena that appear repeatedly in similar environments at different points in time and at different locations. I have the impression that as economic theorists, we hope that regularities will miraculously emerge from the formulas we write leisurely at our desks. Applied economists often feel the need for a model before they mine data for a pattern or regularity. Do we really need economic theory to find these regularities? Would it not be better to go in the opposite direction by observing the real world, whether through empirical or experimental data, to find unexpected regularities? Personally I

doubt that we need pre conceived theories to find regularities." (Rubinstein 2006: 873) Finally what we learn from Knorr Cetina's investigation is the challenge towards the accepted view of a unified science even in the framework of natural sciences. Research procedures can sharply differ in different disciplines, but if they represent interaction with the 'resisting' entities under study, they certainly can be classified as scientific research.

The community of researchers of the Royal Society did not earn their living by their investigating activity. All of them had independent sources of existence which had no connection with their research work. A century later, Johann Fichte, who followed Humboldt, founder of the institution of the research university after, saw the motivation of the researcher in following way: 'To me, [to the Scholar], is entrusted the culture of my own and following ages; from my labours will proceed the course of future generations, the history of nations who are yet to be. To this am I called, to bear witness to the Truth: my life, my fortunes are of little moment; the results of my life are of infinite moment. I am a Priest of Truth; I am in her pay; I have bound myself to do all things, to venture all things, to suffer all things for her' (Fichte 1847: 59 - 60). He thought that 'the true vocation of the scholar is *the most widely extended survey of the actual advancement of the human race in general, and the steadfast promotion of that advancement*' (Ibid.: 54). The institutionalisation of German economics happened in the Humboldtian university and its architect, Gustav Schmoller, followed the ideas of Fichte. In this way Schmollerian *Verein* had been conceived in a similar way to the Royal Society. The foundation of the *Verein* took place quite quickly after German unification. A united Germany needed national unity and the political crisis of early capitalism created danger for this unity. This danger came from the existence of the 'social question'.

Both Schmoller's and Marshall's economics were responses to the existence of the social question; in England it was even sharper than in Germany, but the responses were different.

The former was oriented to helping the state to solve this problem by improving the conditions of the working class by introducing new social legislation, and in this way, to prevent social unrest. The latter was oriented towards creating scientific-looking ideological constructions legitimising the existing social order and conditions, and in this way achieving the same goal, preventing social unrest. Once established the institution of Marshallian economics more easily attracts the support of those who consider the discipline of economics a craft rather than a vocation. The work of Schmollerian economists as researchers and teachers is much more difficult than that of Marshallian economists. Frequent surveys/fieldwork and constant adaptation of courses to changing realities are much more time and labour consuming than the desk work of 'a priori theorists'. Very quickly the community of economists-craftsmen can become an inaccessible fortress for those who would like to practice economics as a vocation with primarily socially-oriented aspirations. The problem with Schmollerian economics in comparison with Marshallian economics is not only social but also economic and political. Surveys and fieldwork require strong financial and political support from governments (local and/or central). The political support of Schmollerian scholars is necessary because their research activity can uncover inconvenient details about the functioning of private enterprises. Resistance to Schmollerian economists can occur in the organisation of surveys and field studies, in financing or in the domain of the recruitment and promotion of teachers/researchers controlled by university boards with businessmen as its members.

After World War II, two organisations sponsored by businessmen, Cowles Foundation and Mont Pelerin Society, extended the influence of mainstream economics in universities and societies. The prestige of this economics has been supported by the creation of the so-called Nobel Prize in Economics. This influence determined the course of the American (Reagan's) and the British (Thatcher's) governments, and later produced massive deregulations

throughout the world. This moral philosophy with the vision of social life as a network of exchanges of commodities and services between egoistically-oriented *homo oeconomicus* moved by the desire of unlimited consumption, which is propagated by mainstream economics, conquered the world. This conquest is one of the factors of the extraordinary stability of the institution of economics dominated by the mainstream. A reform of the discipline of economics should take the form of a return, on modern foundations, to the traditions of the Historico-Ethical school of Gustav Schmoller (Koslowski 2000; Nau 2000) and of the Wisconsin institutionalism of John Commons (Rutherford 2006; Chavance 2012).

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