

**Exploring the Genesis of Economic
Innovations:
The religious gestalt-switch and the *duty to
invent* as
preconditions for economic growth.**

<http://daastol.com/artprof/wolff.html>

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Introduction.

This is a paper about economic growth, and implicitly also about the lack of it. We postulate a religious/philosophical *gestalt-switch* - a fundamental change of Man's world view - as a necessary pre-condition for economic growth. Our contention is that the *attitude to creation of new knowledge* - which is changed by this *gestalt-switch* - is a basic but neglected explanatory variable for economic growth and its absence.

In order to explain the nature of this *gestalt-switch* we construct two categories - two ideal types - of *Weltanschauungen*, or 'world views': One mechanical and static, centered around 'matter', and 'sein' (being), and one dynamic and organic, centered around 'thought' (Logos) and 'werden' (becoming). These categories also find their counterparts in the sphere of economics. In economics, the mechanical world view is centered around barter, accumulation, physical metaphors, equilibrium, and optimality. In this mechanical view, a fundamental characteristic of Man is his propensity to barter. The organic view in economics is centered around inventions, production, evolution, biological metaphors, and disequilibrium. This paper endeavours to show that this non-mechanical and organic model of economics - evolutionary economics - has its historic origins not in Darwinist or Lamarckian biology, but in the philosophy and economics of the Renaissance. The scarce historiography of evolutionary economics¹ has so far neglected these authors, who were no doubt extremely influential at the time.

In any evolutionary system, almost by definition, no optimality exists, except as an ever-moving target in the distance². In this organic view a fundamental characteristic of Man is his propensity to explore, to invent, and cumulatively and continuously to create new knowledge. We argue that in this perspective today's evolutionary economics may be seen as being too 'mechanistic'. Evolutionary dynamics has been added to economic theory, but this brand of evolutionary economics seems to underestimate the role of *conscious human effort* - individual and collective - as the main engine propelling evolutionary change. If evolutionary economics only means substituting 'biology-envy' for the previous 'physics-envy', economics will still suffer from *Entgeistung* - from being devoid of *Geist* or Mind - a term used by 19th Century German theory in criticising English classical economics. We shall also argue this alternative non-mechanical economic theory - which was at the core of the Renaissance - contrasts with the 'natural selection' analogy which e.g. Hodgson claims as the basis for the new wave of evolutionary modellers.³ The alternative non-mechanical tradition - from the Renaissance through economics of Nicholas Kaldor - tended to be based on an untraditional mode of inference: on *abduction*⁴ rather than on induction or deduction.

We shall argue that the conflict between a mechanical world view and a dynamic one, based on Man's rational being and soul, also was at the core of an important early debate in English economics. This fundamental philosophical debate between Misselden and Malynes in 1622-23 now appears in the history of economics - filtered through the lenses of neo-classical economics - merely as debate on exchange control and the balance of trade.

The two ideal types - the organic and the mechanical - are probably both always present in every human being and in every society. However, in every human being, as well as in every historical period, the balance between them differs. Some individuals, just like some historical periods, are more creative than others. The dynamic and organic world view creates a changing world of

imbalances and insecurity. The mechanical world view restores the picture of a stable, balanced, and apparently organized world.

Sequentially, it would appear that initially a dynamic and inventive world view creates wealth, whereas a mechanical world view moves in later in order to explain and to create order, an order which to some extent probably is only a mental illusion. The cycle of ascent and decline and nations somehow seems to relate to changes in relative importance of the two contrasting *Weltanschauungen*.

It would also appear that, seen in time, a *techno-economic paradigm*⁵ essentially consists of one such sequence of a creative burst, followed by a period of increasingly mechanistic and uncreative human activity, until the next creative burst explodes. A new paradigm is created by a radical innovation, e.g. steam power or electricity, which affects most activities, setting fundamentally new technical standards and 'rules of the game'. Inside one techno-economic paradigm, less dramatic and incremental changes take society down a new learning curve. This learning curve, initially steep, gradually flattens out as the potentials of the paradigm are exhausted. Simultaneously the more mechanical *Weltanschauung* gains predominance, until a burst of human creativity again 'creatively destroys' the old stagnant order, forming a new techno-economic paradigm. Since different nations or regions, at any point in time, will be in different stages of this process, they appear to us as slowly ascending or declining in economic importance.⁶

We would argue that we today collectively suffer from problems attributable to an overdose of 'order', of mechanical economics. This falsely creates a 'Harmonielehre'⁷ - a passive system of automatic harmony in income distribution. This focus on order and formality in economic theory carries with it costs to society in terms of

a) neglecting the importance of invention and new knowledge as one of the pre-conditions for economic growth, thereby curtailing wealth creation, and
 b) leaving an unnecessarily large part of mankind in poverty. Through its basic assumptions, today's standard theory has created a 'blind spot' for anything but an even distribution of wealth.⁸ Our limited understanding of wealth creation is intimately tied to our limited understanding of how wealth is distributed.

It would also seem that a paradigm shift affects sciences in a sequence which may vary according to the nature of the particular paradigm-shift. One scientific discipline will be the leader, another the laggard. In our opinion, economic science is presently a laggard, being a prisoner of its own toolbox. Like many others, we would argue the need for a careful but 'creative destruction' of the axioms of economic science, creating a new and more dynamic *gestalt*. In our view, however, economics should venture well beyond the constraints of natural sciences - be they physics or biology - to place itself in a framework of the *Geisteswissenschaften* - the 'sciences of the mind', the Humanities.

We would suggest that the new and coming *gestalt* will have to carry with it important insights from the previous *gestalt-switch* which took place in the Europe of the Renaissance. An important philosopher and economist, who was pivotal in laying the theoretical foundation for Germany's economic ascent, is Christian Wolff (1697-1754). Wolff was a true polyhistor, laying the foundations for all later German philosophy, and contributing in a fundamental way to such diverse sciences as mathematics, physics, meteorology, linguistics and international law. A modern historian of law describes Wolff as the most important philosopher of law since Emperor Justinian (3rd Century A.D.).⁹ His collected works comprise tens of thousands of pages, and his role in the

transformation of Germany was a crucial one. 'The centre of scientific life in Germany during the eighteenth century was formed by the teaching and school of Christian Wolff', according to a classic work in the history of philosophy¹⁰. In economics Wolff represents a 'vital' and organic school, in strong opposition to a static, mechanical and deterministic world view. We shall examine his basic teachings as they relate to economic change, and argue that his insights are very useful to the process of vitalisation needed in economics today.

The first part of the paper briefly discusses a fundamental problem in economics: The tension between creativity and formalism. Part two gives a description of the search for the 'proximate causes' of economic growth in the post-war era as a continuous uncovering of new factors, or 'reactants'. Part three discusses the contrasts between neo-classical and evolutionary economics in this context. Part four traces the evolution of the *religious gestalt-switch* which fundamentally changed our attitude to knowledge, and in which Wolff played an important part. Part five briefly discusses the English version of the *gestalt-switch*, which happened before the German one. Part six discusses the holistic, organic and dynamic system of economics created by Leibniz and Wolff. Part seven discusses the role of Man's will, invention, and creativity in Wolff's 'System of Duties'. The concluding part constitutes part eight. An appendix brings a partial translation of Wolff's main work as regards economic change and innovation.

1. The tension between creativity and formalism in economics.

Central figures in the history of economic thought come across as being in two minds - one could almost say schizophrenic - in their attempt to reconcile the creative and dynamic world view with the formal and static one. We shall give two examples of this.

An important and creative economist living in the eternal tension between mechanical stability and creative growth was Joseph Schumpeter. On the one hand the equilibrium-centered formalist Walras was his favourite economist, on the other hand he himself is known to posterity for his theory for putting *disequilibrium*, and factors which are very difficult to formalise, like 'creative destruction', at the center of economic theory. Schumpeter admired the exactness of the mathematical language of equilibrium analysis, but his own contribution to economics was centered around an evolution of knowledge not captured by formal deductive mathematics.

Alfred Marshall on one hand states that 'the Mecca of economics is in biology'¹¹. At the same time, in the appendix of the very same book, Marshall lays the foundations for an economic science which brings to an end all biological metaphors in economics, opening up for a science based exclusively on physical metaphors ('physics-envy'). Still, in order to create equilibrium, Marshall paradoxically had to restore to a *biological* metaphor. Increasing returns had been an important argument for industrial policy ever since Antonio Serra in 1613¹² all through the 19th Century. In order to reconcile the existence of increasing returns with equilibrium, Marshall uses a lengthy metaphor of firms growing and dying like trees in the forests.¹³ This evolutionary growth process supposedly counteracts the tendency towards uneven accumulation caused by increasing returns to scale.¹⁴ The argument which killed all future biological analogies in neo-classical economics, was a biological analogy. This biological analogy was important in making economics into what it is today, a profession where a physics-inspired equilibrium is the central gestalt.

Once the biological metaphors were gone, economic inquiry embarked upon 'the path of least mathematical resistance', to quote Paul Krugman.¹⁵ In this process the economics profession gained much in terms of analytical rigor. However, for the understanding of **economic growth**, this rigor proved to be a *rigor mortis*. When the process of mathematisation had been perfected, that subject was gone.

The choice of language is important to whether ideas can be transmitted. For a discussion of the different properties of snow, Swahili would be a poor choice. Communicating on this subject in an Eskimoan or Lapp language would certainly lead to a much better understanding. Similarly, linear mathematics based on 19th Century physics has proved unsatisfactory for understanding the creative processes underlying economic change.

2. Exploring the sources of growth and forever finding new ones.

Kuhn¹⁶ describes a process where contradictions between the realities observed and the ruling theoretical paradigm build up towards a paradigm shift. In the 1990's there is a growing awareness among economists of the inadequacy of our understanding of economic growth. As a result, there is a renewed interest in the sources of growth. During the exceptional growth period after the 2nd World War, what French economists refer to as the 40 years of *gloire*, only the Third World gave us a continuous reminder that there were still things to be understood. During the long post-war boom, anyone with a vision limited to Europe and the United States, could, under the circumstances, be forgiven for reasoning that by solving the cyclical problems of the economy we had simultaneously solved the problems of long-run growth. For many years, economic growth was largely seen as a mechanical result of the accumulation of capital.¹⁷ This was already pointed out by Friedrich List in his criticism of Adam Smith's theory.¹⁸

A change in attitude has slowly built up and gathered momentum in the 1990's - perhaps due to a new and different demand on US economists to explain the lack of growth and the lack of 'competitiveness'. A collective complacency has slowly given way to uneasiness. 'The Economist', normally a staunch defender of the profession, declared in 1992 that 'True enough: economists are interested in growth. The trouble is that, even by their standards, they have been terribly ignorant about it. The depth of that ignorance has long been their best-kept secret.'¹⁹

Signs of an inadequate understanding of growth had been around long for those who wished to see them. In the Third World it became increasingly clear that we were addressing the symptoms rather than the causes of economic welfare. In 1956 Moses Abramowitz of Stanford University showed that capital accumulation only accounted for 10-15 % of US economic growth. The remainder - the 'residual' of 85-90 % - he referred to as 'a measure of our ignorance'. In the first instance this led to a relatively fruitless search, essentially for the factor capital hidden in other factors, generally referred to as 'growth accounting'. Many years later, in 1993, noting the lack of progress in explaining the 'residual', Abramowitz teases us by questioning whether it can get much worse. Can we be more than 100 % ignorant? Yes, he says, we can be more than 100 % ignorant. 'What worries me is not what we don't know, it is the things we think we know that ain't so'.²⁰

Starting from a capital-centered view of growth, the economics profession has moved through various layers of explanations - unknowingly approaching the

understanding of economic growth much in the same way one would peel an onion, ever finding a new issue once the previous issue had been brought into view. Very early theories of development tended to focus on geography and climate. In the neo-classical tradition *capital*, of course, is the main factor which virtually alone was supposed to account for the growth process. Schumpeter once referred to this as 'the pedestrian view that it is the accumulation of capital *per se* that propels the capitalist engine'²¹. Outside the mainstream human creativity, in the form of *entrepreneurship*, was studied. Also here, in the atomistic tradition of modern economics, focus was mostly on individuals, not on society or its institutions.

In the late 1960's focus shifted to *technology*. An early and important book in this tradition was David Landes' *The Unbound Prometheus*²². Technology is normally seen as consisting of two parts, a 'hard' part - the tool or machine - and a 'soft' part - human knowledge. For a long time, the study of technology concentrated on the 'hardware', the machine. Implicitly, knowledge was seen in the light of neo-classical 'perfect information', and therefore not important to technological change. Consequently 'technology transfer' came to be seen as a transfer of hardware, of machinery, while little attention was paid to human knowledge. Knowledge was seen to be 'codified' - as in instruction booklets - and easily transferred. This is the formal and static interpretation of knowledge, as opposed to an alternative view which is more tacit, intuitive, and creative.

As a next step the entrepreneur and the machine came to be seen as part of a *system* which continuously created innovations - a 'National Innovation System'²³. This brand of evolutionary or Schumpeterian approach got its 'seal-of-approval' by the establishment through a large OECD programme, 'Technology and Economy', which was finished in 1992.²⁴ The layer which required understanding after 'the machine' - the hardware of technology - was 'knowledge'. Slowly the concept of *knowledge* itself was brought into focus - and the importance of 'tacit' or uncodified knowledge was acknowledged.

Just as 'werden' - becoming, is a dynamic version of 'sein' - being, learning is the dynamic version of knowledge. All forms of *learning* have lately come into focus²⁵ in evolutionary economics: Institutional learning, learning-by-doing, learning by interaction, etc. A sign of the times is that the last OECD economic conference, in Copenhagen in November 1994, was held under the title: 'Conference on Employment and Growth in the Knowledge-based Economy.' The inadequacy of the neo-classical theoretical framework, with perfect information at its core, is becoming increasingly clear, as *human knowledge* more and more is seen as the basis for wealth creation. Even in the latest mainstream textbook in economic growth, the foreword states that 'Economic growth comes largely from the accumulation of knowledge'²⁶. Economic thinking is entering this new and, economists presume, uncharted territory.

The present zeitgeist points out *knowledge* as the key factor in explaining growth. This honour had previously been bestowed on *capital* and on *technology*. But, as our understanding of these factors increased, their inadequacy in explaining economic welfare also became apparent. Economic growth must be seen as a product of several 'reactants', each one a necessary but in itself insufficient factor. These reactants include geographical circumstances like climate, natural infrastructure (e.g. waterways), capital, entrepreneurship, institutions - like a systematic framework of law²⁷ - , a technological 'window of opportunity', technological hardware and *changes in the stock* of human knowledge, i.e. learning. But, this is clearly not the end of the search for the 'proximate causes'²⁸ of economic growth. We are - like Ibsen's *Peer Gynt* -

peeling an onion and always seeing new layers. Which one will appear beneath the factor 'knowledge' ?

As when technology was put into focus, it seems that David Landes - professor of history emeritus at Harvard University - is again at the frontier of finding the proximate causes - or new reactants - for creating economic welfare. Landes now states that picking up *The Unbound Prometheus*, with its emphasis on technological hardware, is 'like walking into a kitchen built in the 1960's'.²⁹ Pushing the frontier of knowledge beyond factor technology, the next question in Landes' own *onion* - after light has been shed on the previous layer - regards the distributive aspects of technological change. In particular he looks at why the center of economic gravity at a certain point in history moved from the South of Europe to the North. Why did the Mediterranean lose its scientific and economic leadership to Holland and England? In Landes' forthcoming book - *The Wealth and Poverty of Nations* - the factor explaining the relative decline of the South and the rise of the North is **attitude to knowledge**. To Landes 'mark 1996', the center of economic gravity from Southern to Northern Europe came as a result of *differences in attitude towards new knowledge*.

In order to explain historical attitudes to knowledge, religion will automatically enter the picture as an explanatory variable. Religion as a factor in explaining economic growth has centered around the debate following Max Weber's 1929 book *Protestant Ethics and the Spirit of Capitalism*. This factor had earlier been pointed out by authors like Adam Müller, Wilhelm Roscher, and Ernst Troeltsch. Landes quotes Kurt Samuelson's discussion of the Weber controversy.³⁰ Max Weber and Werner Sombart³¹ each saw different religious systems of belief as promoting the values of growth and capitalism. The English historian Tawney, on the other hand, saw the *decline* of religion as the cause of capitalism.³² In this paper we shall argue that the relationship between religion and economic welfare is not directly a question of a Protestant vs. a Catholic view, nor of an ascent or decline of religion as such. An important factor in the rise and shifts of gravity in capitalism seems to have been fundamentally different attitudes towards new knowledge. This phenomenon is not unrelated to the Reformation, but, as Weber's critics have pointed out, the question is much broader and older than that.

Variations in religious interpretation of Man's position in relation to Nature and God seem to have determined the scope and energy of the searching process for new knowledge - whether this process is wide and energetic and breaks with old routines, or weak, 'bounded', constrained by taboo, and myopic. If, e.g., the Church does not allow autopsies, little progress will be made in the medical sciences. Ultimately the difference in attitudes towards new knowledge reflects two fundamentally different views of the nature and image of Man. In this system, the decline of the Mediterranean and the ascent of Northern-Central Europe is a result on one hand of a growing hostile attitude towards new knowledge in the South, exemplified by the trials of the likes of Galileo and Giordano Bruno. On the other hand, Northern Europe took up the new view of Man and his 'duty to explore and invent' - exemplified in the writings of Christian Wolff which we shall discuss later in the paper.

The processes of accumulation of knowledge in the North were evidently helped by the emigration of refugee scholars from the South, especially from Italy,³³ just as Italy earlier had been blessed with refugees from Constantinople, both before and after its conquest by the Turks.³⁴ These refugee scholars transferred knowledge much in the same way that entrepreneurs and industrialists, subject to religious prosecution, were instrumental in the spreading of industrial skills across Europe.

In the search process for the approximate causes of growth, the question arises whether we are bound to follow the path of Ibsen's Peer Gynt, to whom the onion - and his inner self - only revealed layer after layer, but no core. The important French philosopher Descartes banished final causes, on the grounds that we cannot know God's purposes. The alternative tradition presented in this paper would argue that there is a core. The core of Man is rational, Leibniz and Wolff would claim, and he therefore has the potential to understand God's purposes. In this tradition it is important that Man was made in God's own image. God is active, rational, creative and perfect. It is therefore Man's **duty** to strive for this same kind of perfection through learning, explorations and inventions. This will lead him to happiness. In this tradition, starting with Plato, the *soul of Man* becomes the core, not only of the layers of explanations which lead us to understand economic growth and welfare, but of science in general.

We shall argue that this territory has been well charted before, but 'unlearned', particularly in economics. In our opinion this loss is due to emergence of empiricism as the dominating philosophical paradigm. An understanding of the crucial change in the attitude towards knowledge which creates growth, and changed the center of economic gravity from Southern to Northern Europe, can best be understood through the study of a religious *gestalt-switch* which started evolving through the late Middle Ages. The new attitude to knowledge was a precondition for sustained economic growth. The existence of a market clearly was another precondition. But, without the new attitude towards learning and creativity, the goods exchanged in the marketplace today would essentially have continued to be the same as during the Centuries before the Renaissance.

The new attitude towards knowledge can best be understood in the context of the 'system of duties' created, among others, by German philosopher Christian Wolff. In such a system, the industrial revolution and economic progress was 'willed', it was a product of a conscious collective decision to improve Man's material conditions, and through that, his happiness. We would argue that beyond this, the next, and probably last, layer of causes of economic welfare will be found in the study of the 'image of Man' - in the Platonic tradition rather than in the Aristotelian tradition of philosophy. In this tradition 'true essential reality...could be grasped only by thought, in contrast with perception.the Platonic system thus becomes immaterialism.'³⁵ The **idea** is the core, not sensual perceptions of reality.³⁶ The essential moving force behind the physical and monetary flows of an economy is Man's ideas.

What other economists have identified as the moving force of the economy, are all dependent on Man's ideas: The term 'capitalism' indicates that capital is the moving force of the economy, but others, suggest that the accumulation is the result imperfect competition resulting e.g. from technical change³⁷. Adam Smith sees Man's propensity to barter as the moving force. Marx sees Man's use of tools as the key feature. US economist E. Peshine Smith³⁸ claimed that Man's domination of the forces of Nature is the most important feature. Schumpeter sees innovations at the moving force. These are all necessary conditions, but they one and all rest on Man's **rational will** and **ideas**. The ultimate moving force of the economy is thus ideas. The other moving forces - barter, tools, innovations, domination of Nature - all originate from Man's ideas, and are as such mere symptoms of progress, not causes. In a sense, the name capitalism is therefore somewhat of a misnomer. Unfortunately the word **idealism** is already in use with different connotations.

3. Evolutionary vs. neoclassical economics - the historical roots of the conflict.

As a result of the growing uneasiness with the shortcomings of neoclassical theory, this theory is being challenged by an alternative evolutionary world view. Nelson and Winter's 1982 book *An Evolutionary Theory of Economic Change*³⁹ is considered as the starting point for today's renewed interest in evolutionary economics, although its origins are well-rooted in the teachings of Schumpeter. Prof. Erich Streissler has traced the influence of 19th Century German and Austrian economics on Schumpeter⁴⁰. It is however, possible to trace the origins of today's conflict between neo-classical and evolutionary economics much further back: Here Christian Wolff, not surprisingly to those who know the roots of German economics, comes across as one of the spiritual forerunners of evolutionary economics. The counterpoint of the conflict is - in shorthand - the *static equilibrium* of neo-classical economics vs. a *dynamic evolution*.

Today a group of philosophers and historians of economics discusses neo-classical economics as being modelled on late 19th Century physics, and how the concept of equilibrium, Marshall's scissors of supply and demand, came to be its central *gestalt*. In his book *More Heat than Light. Economics as Social Physics, Physics as Nature's Economics*⁴¹, Philip Mirowski attacks the 'physics-envy' of present-day economics. Mirowski quotes Argentine author Borges' assertion that 'universal history is the history of a handful of metaphors'. Mirowski's counterpoint becomes neo-classical economics with its metaphors from physics vs. an alternative theory based on 'natural images' or biological metaphors.⁴²

The two focal points, mentioned above, in the economics profession today are essentially based on similar critical attitudes towards static theory and its physical metaphors. The two groups have a lot of common ground, but do not seem to communicate. Their origins go back to Leibniz and Wolff, among others. With these 18th Century Germans, the modern approach shares a dynamic world view, which emphasises the 'never-ending frontier' of science and innovation. However, Leibniz, 'his faithful henchman Christian Wolff'⁴³, and their followers differ from Schumpeter, Nelson, Mirowski and today's evolutionists on a crucial point. Leibniz and Wolff emphasise the role of *conscious human will* as a moving force in economics. This human will acts both on an individual and on a collective level. Compared to Leibniz and Wolff, today's evolutionists are in some sense too 'mechanical'.

The science of Leibniz and Wolff is not the dismal science of the English classical economists, but, as we shall see, a science of duties leading to joy and harmony. The pessimism of the young Malthus as regards population is an example in point. This contrasts sharply with the typical German cameralist view - later followed by List and Schmoller - that the greatness of population was a main determinant of wealth: The creativity of the human mind would more than compensate any diminishing returns from land.

The point of divergence between neo-classical economics and evolutionary economics can be traced back to these philosophers. The Plato-Cusanus-Bruno-Leibniz-Wolff tradition has a dynamic world view emphasizing *new knowledge* and *production* - cast in the mode of 'werden', or becoming. The modern Anglo-American tradition is cast around the concept of 'sein' - being. It emphasises a mechanical division of labour, and at its core we find the process of *barter and exchange* rather than production. To Adam Smith Man is different from other animals above all because of his *propensity to barter*. Adam Smith illustrates this by contrasting Man with a dog, because dogs never consciously barter.⁴⁴ To

Adam Smith the division of labour is the cause of progress. In the spirit of Wolff one would argue that there would be no division of labour, except as a result of the creativity and inventiveness of Man. Consequently what distinguishes a human being from a dog is not the propensity to barter, but, in Adam Smith's terms, the *propensity to invent new ways in which to divide labour*. To Wolff, the fact that these products later have to be bartered in a market, would have been a secondary, and much less important consideration.

In the Plato-to-Wolff tradition, Man is different from animals because of his ability to think rationally according to principles, e.g. abstraction. Economics in this tradition becomes an optimistic science, because of Man's seemingly unlimited capacity to invent. Economics in the English barter-centered tradition becomes a dismal science because, following up in Adam Smith's metaphor, it is not clear why and how more dog bones, not to speak of canned dog food, would suddenly appear among a society of bartering dogs. The failure of neo-classical economics to incorporate technical change is deeply rooted in this tradition of seeing Man essentially as a bartering animal, and not as a creative and inventing one. Smith's crucial insight on the 'division of labour', which in the end could not be attributable to barter alone, has not been incorporated into present mainstream economics. Mainstream economics focuses on 'Man the Consumer', whereas in the Wolff tradition focus is on 'Man the Producer'.

Another sign of Smith's failure to see the importance of new ideas, is his view that the rate of profit will have to fall. It is not well known that this idea, which was later to gain much prominence with Marx, actually originates with Adam Smith. In the absence of new ideas and inventions, the rate of profit will fall for three reasons, and it is not clear which of the three, or all, Smith refers to⁴⁵. First, the rate of profit will fall because of a tendency towards a more perfect competition. Secondly, the rate of return on capital will fall because there will be more capital around, and more capital chasing the same number of investment opportunities will lead to a falling rate of profit. Thirdly, continuing progress would depend on a further division of labour. This Smith saw as tied to geographically expanding markets, which eventually will be saturated. Both Smith and Ricardo fail to understand that all these tendencies will be counteracted by a flow of new ideas and inventions which will both a) Increase the demand for capital in a growing economy, and b) Add new products which initially will be traded under conditions of temporary monopolies. This mechanism, whereby capital continuously have to seek new ideas and innovations in order to keep up the profit rate, is at the core of the Schumpeterian system. In this system, the fall of nations is accompanied by capital flight which starts when the national system fails to produce innovations.⁴⁶ This phenomenon could be observed from Venice and Holland to England as England ascended, and from England to the US as England descended. The mechanism is a fairly straightforward one: Inward capital flows are determined by a nation's propensity to invent and innovate; in other words by *investment opportunities*. These investment opportunities provided by inventions and new products, in a process which is greatly facilitated by government initiatives, e.g. in education, infrastructure, and warfare.

In the English-based mainstream economics, under the assumption of perfect information, new learning is absent - or must be seen as 'manna from heaven'. It is not clear that human will - in the form of inventions, business strategies, or economic policies - in any way can affect the size of the flow of manna. The connection between learning and welfare is here, at best, indirect through mechanical forces which are not consciously created. In neo-classical economics all economic activities, for all practical purposes, tend to become 'alike'. The world is populated by cloned 'representative firms', and government policy is

supposed not to differentiate between firms or industries. In the Leibniz-Wolff cameralist tradition, as well as today's evolutionary economics, the variety and uniqueness of human economic activities are central to the system. Canadian economist John Rae (1834) was the first to point out the connection between a society's propensity to save and its propensity to *invent*: Savings were to Rae basically not a result of thrift, but of retained earnings from imperfect competition created by inventions and technical change.⁴⁷

Leibniz' 'vitalist' view contrasts sharply with the static mechanisms of modern economic theory. To Leibniz the world is not to be understood in terms of *geometrical* principles, as it is with Descartes and Newton, but according to *dynamic* principles. Compared to Descartes and Newton, Leibniz inverts the order of explanation of how the world is to be understood: Descartes and Newton explain the organic world based on the understanding of *inorganic* phenomena - understanding 'the living from the dead'. This leads to the 'physics-envy' of today's economic theory. Leibniz, and later Goethe, on the contrary, explain 'the dead from the living'. To them, lower level forms are to be explained by higher level forms. God's power of creation being the highest form, creativity looms high as an explanatory variable in Leibniz' world view. In the static Newtonian tradition of classical and neo-classical economics, Man is just another material factor of production, and the equilibrium of supply and demand is at the core. In the Leibniz-Wolff tradition Man's free will and creativity become the moving force of the economy. Economics becomes a dynamic, evolutionary and anthropocentric science, i.e. Man's creativity is at the very core.

In the 'physics envy' of neo-classical economics, economics and the social sciences are 'soft' disciplines, which are in some way inferior to the 'hard' natural sciences. The Leibniz-Wolff tradition, continued in the works of philosophers like Wilhelm Dilthey and Hans Georg Gadamer, refuses any such subordination. In Dilthey's view, the social sciences, concerned with the ends and values instead of laws, should aim to **understand** (*verstehen*). The natural sciences, on the other hand, aim mainly to **describe and conceptualise** (*begreifen*). *Qualitative* relationships are at the core of the *Gesteiswissenschaften* - the Humanities, or literally, sciences of the mind. A crucial aspect of these sciences is therefore their *irreducibility to natural science*. Paradoxically, although economics is about numbers, there is also a basic incommensurability between numbers (quantities) and some fundamental aspects of economic science. In the German economic tradition, the inner unity (*Strukturzusammenhang*) of the *Geisteswissenschaften* - its refusal to isolate 'economic man' from the rest of the human being - shines through from Leibniz to Max Weber.

Near the core of this problem, we find the struggle between *nominalist* and *realist* conceptions of the status of the *common terms* - universalia - at the end of the Middle Ages. The former - nominalism - as a quantitative relationship, outward and accidental, and the latter - realism - as a necessary inner qualitative relationship concerned with structure and meaning. The former is typically represented with the British empiricism of Hobbes, and the latter by the Platonic tradition. This controversy continues today in the theory of science as a discussion of the role of theory: *instrumentalism vs. realism*.

4. The religious gestalt-switch: From religion as a deterrent, to religion as a promoter of economic growth.

After Kuhn's *Structure of Scientific Revolution*⁴⁸ fundamental changes in the sciences have come to be called paradigm shifts. A paradigm shift is a fundamental change in the conception of reality. It involves a *gestalt-switch* - the gestalt in question is seen as being a totally different one, the world is no longer flat but round. We shall argue that the basis for the economic growth and welfare of the Western world was a religious gestalt-switch. This switch has long historical roots, building up within the Catholic Church through the late Middle Ages. At the same time, the switch is caused by a change in emphasis from one Greek philosopher to another. The driving force of the gestalt-switch was an increasing dissatisfaction with the fruitlessness of the static interpretation of Aristotle in the scholastic tradition, occupied with static relations of categories and syllogisms. The new gestalt was based on a dynamic interpretation of the newly introduced writings of Plato, which gave impetus to the Renaissance and totally dominated this period. Our interpretation of the changing philosophical emphasis, is based on the neo-Kantian tradition of Wilhelm Windelband and Ernst Cassirer.

The roots of the dynamic, holistic, and idealistic world view which came to be the characteristic feature of German economic thought, can be traced even further back than Plato, to Heraclitus (536-470 b.C.). He added a dynamic dimension, 'werden' - becoming - to the static material world of 'sein' - being. 'Being' was at the core of the world gestalt of his predecessors, in his lifetime represented by the Eleatic School of Xenophanes and Parmenides. The holistic world of Heraclitus and Plato was based on *Logos*, thought. In contrast, atomism was based on *matter*. The atomism which later was to characterise John Locke and English economic liberalism, was first made explicit by Leucippus (5th Century b.C.) and his pupil Democritus (460-370 b.C.). Epicureus (341-270 b.C.) developed atomism in the social sphere.⁴⁹

Through the Middle Ages the Aristotelian-scholastic tradition caused religion to be a strong deterrent in the search for new empirical knowledge. The Holy Scriptures - supplemented especially by Aristotle - were seen to hold, 'at least implicitly, the sum of knowledge useful or indeed possible for men'.⁵⁰ In the mediaeval philosophical tradition, religion is at the core of the argument against searching for new knowledge outside the Scriptures and Aristotle. A search for knowledge outside these sources almost automatically became a heresy. Using such knowledge would 'disturb the equilibrium of nature'.

A necessary foundation for later economic growth was that *this religious argument was turned upside down*. The gestalt-switch was based in a new and dynamic interpretation of the same Scriptures. The Scriptures which previously served as a straightjacket preventing Man from seeking knowledge outside his immediate boundaries, could now be used to argue for the exact opposite case. The Holy Scriptures + a static interpretation of Aristotle deterred the supply of new knowledge. The same Scriptures, adding the long-forgotten views of Plato, provided for a world where explorations and inventions were not only tolerated - with Leibniz-Wolff they even became one of the main duties of Man. This was very much in the spirit of the Renaissance. First in Roger Bacon (1214-1292), later in Nicolas of Cusa (1401-1464), Leibniz (1646-1716) and Wolff (1697-1754) the perfection of God was turned into an argument for searching new knowledge so that Man could strive towards Godly perfection. This turnaround in the use of religious argumentation made it a duty, not a heresy, to discover, experiment, and invent. This transformation was based both on Platonic and Aristotelian traditions. According to Windelband, this transformation also involved infighting between the Aristotelians - empirically oriented Aristotelians in opposition to scholastic Aristoteleanism. However, the new spirit of the

Renaissance was to be identified with the Platonic opposition which was new and therefore more interesting.

Windelband, however, omits the crucial role played by the conscious emphasis on the use of *hypotheses* in the philosophy of the Renaissance, which was the contribution of the neo-Platonists continued by Wolff. According to Wolff, philosophy is a study of the possible ('werden' = becoming) as opposed to the present reality ('sein' = being)⁵¹. He thereby relates back to the Greek pre-Socratic struggle of Heraclitus and Democritus referred to above. Hypotheses are the form in which new ideas appear. Hypotheses therefore characterise the difference between narrow fact-related empiricism and dynamic rationalism. They also mark the difference between formal logic (axiomatic deductivism/Euclidean geometry) and non-Euclidean geometry. Aristotle follows Plato in so far as they both see experience awakening the slumbering ideas within us. However, he does not follow Plato in recognizing that man potentially creates, through his self-moving spirit, new thoughts appearing in the form of lower and higher *hypotheses*. Based on sets of lower hypotheses on causal relations - what Kepler calls 'explanatory hypotheses' - Man is able to abstract higher hypotheses or *principles* - what Kepler calls 'true hypotheses'. It's man's duty to discover these principles, through experience, hypothesising, and experimenting - and to utilise and implement them through inventions. In a sense, the struggle between 'werden' and 'sein', today underlies the contrast between a relatively optimistic evolutionary economic science in a setting of 'werden', and a 'dismal' static neo-classical theory in a setting of 'sein'.

The use of hypothesis was strongly rejected by Newton, which he saw as being opposed to the idea of experience and experiments. Leibniz, on the other hand, insisted that hypotheses were needed to complement experience.⁵² In spite of his opposition to using hypotheses, Newton naturally made many hypotheses himself.⁵³

Many pathbreakers for the religious *gestalt-switch* suffered persecutions as heretics. Bacon was arrested in 1277 because of his teachings, which contained 'suspicious innovations'(sic)⁵⁴ - *aliquas novitates suspectas*. He probably remained in jail until 1292. Nicolas of Cusa (from Kues near Trier in Germany) was Cardinal and Bishop of Brixen, present-day Bressanone in Italian South Tyrol. Also Cusa (or Cusanus) suffered from local prosecution. Giordano Bruno, his spiritual follower, was tried as a heretic and burned at the stake in Rome in the year 1600. Bruno laid the foundations for the works of Kepler, but also of the tradition of Galileo and Newton.

The emerging neo-Platonic world view saw in all creations the spirit of God - it was pan-theistic. They thereby pointed out the need to explore and better understand Nature as a necessary way to know God. This conveyed an image of God as active, rational and creative. Since Man was created in the image of God, men also had the potential for these same qualities, both as individuals and collectively as the 'State'. As we shall see in Wolff, Man not only had permission to learn, explore, invent, and educate, but indeed a religious duty to do so. Creation was not ended on the 7th day, it was God's will that Man should be creative in order to improve the Creation - and thereby improve both his own condition and that of his fellow Man, both materially and spiritually. This contrasts sharply with the passive role given to Man in the Creation in the works of Adam Smith⁵⁵. In the Leibniz-Wolff tradition, like in evolutionary theory today, that there is no reason to think that the present situation is in any way optimal. As the foremost evolutionary economist says today, '...the equilibrium is strongly path dependent, and today's 'optimum'' may be very local and likely poor stuff compared to what might have been'⁵⁶.

This *obvious suboptimality of the present situation*, compared to the potential - the Unbound Prometheus - which lies in the creative forces of Man, caused Pufendorf, Leibniz, Wolff and other German philosophers to argue for coordinated intervention in the productive life. This need for co-ordination led to the need for the State. The core of German economic discourse became 'Der Mensch und seine Bedürfnisse' - Man and his Needs⁵⁷. Somewhat surprisingly today, these needs also included an fundamental 'need to create'. A system created around a producing and inventing Man 'and his needs', obviously would develop very different values compared to a system where the self-interest of a bartering and passively consuming 'Homo Oeconomicus' rules alone, as in the neo-classical economic system.

After 100 years of fighting totalitarianism, we have a tendency to classify any system not based on individual atomism as 'collectivist'. Interpreting the German economic system in this way is decidedly incorrect. 'The ultimate goal of the ordering of rights became the interest of the individual'⁵⁸, to quote Windelband, Schumpeter's favourite historian of philosophy⁵⁹. The objective of the system was to maximize individual happiness, but, as opposed to the English liberalist tradition, there was no reason to believe that individual self-interest *alone* would lead to an optimal outcome.

In the English liberalist political economy, collective entities like people, society and nations tend to be considered as mere nominal abstractions. However, by Plato, his followers, and also in the German Cameralist tradition, these entities were considered real. In the static English liberalist tradition there is no need for governmental intervention. There is no evolution in the theory, and any intervention will just upset the 'natural' static equilibrium. In contrast, in the mercantilist tradition, the nation-state should intervene in the ongoing evolution in order to maximize the happiness and welfare of the individual citizen. Here lies the beginning of the welfare state as conceived by Christian Wolff. Leibniz anticipated him by suggesting that a national health system should be established.⁶⁰ The health system should be the basis for a welfare guaranteed by the State.⁶¹ Wolff later specifies clearly that he wanted a state which secured welfare for the individual, but not one which automatically provided for him ('Ein Wohlfahrtsstaat, aber kein Versorgungsstaat'⁶²)

This rational pan-theistic view opened for a new tolerance of other religions. In this world view morality was seen as having a totally rational base, which therefore could be understood by everybody. The principle of rationality forms the common basis for 'Natural Religion' which opens up for a reconciliation both with the diverse factions of Christianity and with Islam and Chinese Confucianism. Both Roger Bacon, inspired by Averroës⁶³, and Cusanus, held positive views of Islam. Both Gottfried Wilhelm Leibniz and Christian Wolff held very positive views of Chinese society and Confucianism. China showed both a large population and economic welfare, and therefore, these authors argued, Chinese society⁶⁴ had to have found 'the philosophers' stone.', e.g. the rationally correct principles of life and society. It is interesting to observe the virility of Chinese entrepreneurship throughout South-East Asia today, and the strong emphasis of minority Chinese on high levels of education, in this light. The ethnic Chinese today show the qualities that Leibniz and Wolff underlined in their day. It is interesting to contrast this with Adam Smith's use of China - 50 years later - as an example of a country where a dreadful state of affairs prevailed.⁶⁵

Another source of inspiration to Leibniz, and therefore to Wolff, was the expansionist economic policy of Richelieu and Colbert. Young Leibniz spent four

years in Paris (1690-1694), where he could observe Colbertism, a system which systematically promoted and protected the new knowledge which was continually being created in the manufacturing sector.⁶⁶ Seeing Colbertism in action clearly inspired Leibniz' thoughts. Colbert established the Academy of Science in Paris 1666, Leibniz was later instrumental in founding the Academies of Berlin and St. Petersburg.. It is interesting to contemplate that it was by observing the devastating consequences of the collapse of this French mercantilist system - after the Napoleonic wars - which caused another German, Friedrich List, to convert from being a free trader to favouring the protection of national manufactures in the German Zollverein.

5. The gestalt-switch and the industrialization of England.

Although this paper is centered around the gestalt-switch based on German economist-philosophers, we feel it is important also rapidly to draw a picture of England to show the earlier, but parallel, development here.

The basic idea of *real-ökonomisch* mercantilism, cameralism and Colbertism, rested on the assumption, implicit or explicit, that *some knowledge was more valuable than other*. Consequently, it was in the interest of the State to create and protect such knowledge. On a philosophical level, this valuable knowledge emanates from the mind of Man. Therefore, any theory not taking Man's mind and Man's soul into consideration, will consequently not understand the increase in Man's material condition, i.e. economic growth.

The economic policies resulting from theories of this were kind carried out with varying degrees of understanding of the underlying principles. These policies were, in our meaning of the word, not based on what we today would normally call scientific analysis. These theories were based on 'clues', on a mode of inference called *abduction* - or *phronesis*, Aristotle's third form of knowledge⁶⁷. This tradition is continued by the Italian philosopher Giambattista Vico (1668-1744), by the US philosophical tradition of C.S. Pierce, and in economics in Kaldor's 'stylised facts'.⁶⁸ According to Pierce, '(Induction) can never originate any idea whatever. No more can deduction. All the ideas of science come to it by the way of Abduction. Abduction consists of studying facts and devising a theory to explain them. Its only justification is that if we are ever to understand things at all, it must be in that way.'⁶⁹ Pierce here describes the role played by the formulation of hypotheses in the neo-platonic tradition of Leibniz and Wolff.⁷⁰

We shall explain how policy is generated through abductive reasoning with a parallel from the history of medicine: Starting in the 12th Century sailors in the Mediterranean used lemons to prevent scurvy.⁷¹ This was a very effective policy. However, the explanation as to why this policy worked only appeared in 1929, with the discovery of Vitamin C⁷². Likewise, we would claim that it is entirely possible to establish good economic policies for a time, without fully understanding the factors involved. For example, identifying 'progress' or ability to pay more taxes with the use of machinery in an increasing number of industries, would result in a beneficial public policy, even if the causal relationship between the use of machinery and wealth were not clearly established, or had been 'unlearned'. The intuitive abduction often precedes what we would think of as a more 'scientific' type of knowledge. The view that abduction anticipates 'science' was expressed by the English economist Edward Misselden in 1623: 'Wee felt it before in sense, but now wee know it by science'⁷³. The important debate between Misselden and Malynes is referred to below.

When England started growing in the late 15th Century, the Republic of Venice was already based on such policies. Mercantilist policies aimed at the creation and protection of valuable knowledge included prohibition of emigration of skilled labour - under the penalty of death, and the protection of the home market. In Venice the use of protective tariffs as an instrument of industrial policy - as opposed to a measure to collect revenue - started around 1421⁷⁴, although it had been practised also in Byzantium (see below). Frequently the argument used for introducing tariffs, was to defend the high wages of the Venetian workers. Starting with Henry VII of England in 1485, and perfected by Elizabeth I, this type of economic policy slowly established itself as English mercantilism. A similar system had been implemented in France under Louis XI starting around 1462. An important mercantilist tool to encourage and protect the creation of knowledge, was the patent system.⁷⁵ Also this system was first created in Venice, where already in 1474 'patents of ten-year validity were available to all who registered a new device'.⁷⁶ A further logical policy to protect valuable knowledge embodied in machinery, was the prohibition of the export of machinery from England, which lasted until the 1830's.⁷⁷

The encouragement and protection of knowledge which seemed particularly valuable was at the core of this system. The mercantilist logic was based on what we would call 'pre-Ricardian common sense'. This logic was most clearly stated by William Petty (1623-1687)⁷⁸: If the average industrial workers have annual incomes which are four times those of a farmer, a nation of industrial workers will be much richer than a nation of farmers. This insight was killed off by Adam Smith's preference for agriculture as the most 'natural' activity, and by Ricardian trade theory. The static trade theory does not account for the phenomenon described by Petty, essentially because the factors causing these phenomena could not be grasped and formalised within the framework of the theory. Even today, international trade theory effectively removes as non-existent all factors which distinguish one economic activity from another, in some sense 'all economic activities become qualitatively alike'.

In a sense these policies correspond to Marshall's policy recommendations in the early editions of his *Principles of Economics*⁷⁹ that favourable results will arise from taxing activities subject to diminishing returns in order to subsidising activities subject to economies of scale - especially if one visualises the term as Schumpeter's *historical increasing returns*.⁸⁰

Later economic writers have no doubt that the economic ascent of England starts with the Tudors, particularly Henry VII and Elizabeth I. Daniel Defoe describes the transformation of the English economy, starting during the reign of Henry VII⁸¹, from being a poor producer of raw wool in the periphery of Europe, to being a nation which based its increasing wealth on the processing of wool and the manufacture of woollen textiles. Friedrich List, many years later, was to comment that during centuries one simple maxim had been the substitute for all other economic theories in England: 'Export manufactured goods, import raw materials'⁸².

Did England experience a religious-philosophical gestalt-switch before Germany? We would claim it did. We have already mentioned the role of Roger Bacon. After Bacon, the Cambridge school of neo-Platonic philosophy did to England, what earlier the Academy of Florence had done to Italy. The original impetus of the Renaissance Revolution came to Florence - and to the Academy founded by Cosimo de' Medici (1389-1464) - from Byzantium, the East Roman Empire. The key figure in injecting neo-Platonism in Florence and Europe was Byzantine philosopher George Gemistos Plethon (ca. 1360 - 1452), who charged the teachings of the new Aristotelians with having an unchristian and materialistic

character. From the point of view of economics, it is interesting to note that Plethon praised a protectionist policy in order to stimulate Byzantine industry and economy faced with Italian competition.⁸³

Later Leibniz and Wolff were to be the philosophers of the gestalt-switch in Germany. According to Ernst Cassirer, the Cambridge School of philosophy 'is one of the piers of that bridge linking the Italian Renaissance with German humanism in the eighteenth Century'⁸⁴. Cassirer documents the Italian and English roots of what was to become the German gestalt-switch; 'how a certain group of ideas, which had taken root in Italy through Nicolas of Cusa and acquired a stable form in the Florentine Academy, retains its force in English Humanism and in English philosophy of the Seventeenth and Eighteenth Centuries, in order to finally undergo a rebirth, a sort of metamorphosis and metempsychosis, in the history of German thought.'⁸⁵ The Neo-Platonic heritage was taken to the New World by the Puritans - followers of the Cambridge School.⁸⁶ The impact of the new attitude to science is also discussed in a recent book on 'The Scientific Revolution in National Context'.⁸⁷

A forerunner of the Cambridge school was St. Anselm of Canterbury (1033-1109), originally from Aosta in Italy. The philosophy of the Cambridge school strongly influenced economic policy starting with Francis Bacon (1526-1561), Lord High Chancellor and Reformer of England. Bacon, educated at Cambridge, was the man who turned neo-Platonic interest in Nature into a policy of changing Nature in order to benefit Man. Bacon was 'the impresario, propagandist, and publicist for the scientific revolution that has, in the last three hundred years, shaped our world'.⁸⁸ Reading Bacon's essay '**Of Innovations**'⁸⁹ - written about 450 years ago - brings to mind that there are clear parallels between static Mediaeval scholasticism, which is what Bacon fought against⁹⁰, and the closed-circuited and mechanical system of today's economic theory. Bacon's adversaries labelled his essays 'Good Advice for Satan's Kingdom' - anybody attempting to disturb the natural state of affairs in Nature's equilibrium were seen to promote Satan's Kingdom. Passively adopting - do nothing - was the only acceptable strategy to Bacon's adversaries in a debate which was not unlike the industrial policy debate in our times.

In common with his 13th Century predecessor, Roger Bacon, Francis Bacon held the view that the sciences are organically connected.⁹¹ Man's power over nature was, in his view, an act of imitating the omnipotence of God - to strive for perfection. The parallel to Leibniz and Wolff is clear. To Bacon, experimental science was in itself a religious task. He saw science as 'an exalted co-operative enterprise'⁹². Bacon also writes a book about the Reign of Henry VII⁹³, whom we consider an important point of departure for England's later ascent. Characteristically, Bacon's biography is entitled *Francis Bacon. The First Statesman of Science*.⁹⁴

Bacon wrote a treatise which is interesting to economics: *New Atlantis* - a reminiscent of Plato's *Critias*. About the *New Atlantis* Windelband writes, in a phrase which does not belie its German origin: '...a happy island-people in carefully guarded seclusion is brought before us, which by skilful regulations receives information of the progress in civilisation made by all other peoples, and at the same time, by the systematic prosecution of research, discovery, and invention, raises to the highest point the control over Nature for the practical interests of human life. All kinds of possible and impossible inventions are related in fantastic prophecy, and the whole activity of the "House of Salomon" is directed towards the material state of society,...'⁹⁵The inventions include the telescope, microphone, telephone, explosive material, flying machines, engines with air and water power, chemical discoveries, better culture of plants and

animals, etc. The 'House of Salomon', in Bacon's utopian tract, played the role which was later to be played by Academies of Science and Universities. The utopias were at once a way indirectly to criticise the present order, and to present visions for alternative social orders.

In England, the influence of the Neo-Platonists and the Cambridge School yielded to the Empiricist philosophical counter-reformation led by Hobbes and John Locke (1632-1704). This conflict is also reflected in the main economic debate in early 17th Century England, in 1622-23 between Gerard De Malynes⁹⁶ and Edward Misselden.⁹⁷ In the history of economic thought, this debate is interpreted as being about exchange controls and the balance of trade.⁹⁸ However, by going back to the sources, one finds that the main line of attack by Misselden against Malynes is his 'mechanical' view of man - Malynes has left out Man's 'art' and 'soul'. Misselden quotes at length a paragraph from Malynes, where Malynes reduces trade to three elements, 'namely, Commodities, Money, and Exchange'⁹⁹. Objecting to this definition, Misselden says: 'It is against Art to dispute with a man that denyeth the *Principles* of Art. This sentence (just quoted from Malynes) sheweth Malynes grosse ignorance, not to haue lern't to distinguish the *Principles* of naturall things from their *Essence*....Homo constat anima & copore (sic): A man consists of soule and bodie. Now the *Matter* of a *Man* is a corporeall substance, common to other creatures: but the *Forme* of a *Man* is his rationall soule: whereby he differeth from them all'¹⁰⁰. On the next page Misselden: 'For a *Man* is not said to bee a *Man* in respect to his matter or corporeall substance : for then a beast should be a man : but in respect of his rational soule, whereby hee excelleth all other creatures.' According to Misselden, Malynes - by reducing commerce and economics only to its *matter*, i.e. merchandise and money - . Without Man's art and soul, 'there would be no traffique amongst men, not withstanding the materials of trade'.¹⁰¹

The conflict between the two economists Malynes and Misselden thus anticipates by some 250 years the German critique of the *Entgeistung* of economic theory and by some 350 years the present debate on 'physics-envy'. Misselden's equivalent of *Entgeistung* and 'physics envy' was - he quotes Aristotle on this - *privation*: 'Privation is not Ens or Beeing, because it is not in the subiect which is made by it.' To Misselden, economics is not in the 'Commodities, Money and Exchange', which are merely 'matters thereof'. In the same way 'An House is not an house in respect of the matter whereof it is made; for then all other stone & timber should be a house : but in respect to the *Forme* of it, whereby it is known to be a house.' In other words, the relationship between money and exchange on the one hand and economics on the other, is like the relationship between stone and timber on the one hand, and a house on the other.

The Malynes/Misselden debate emphasises the point that the debate on its own philosophical underpinnings has haunted economic theory from its very inception. It also goes to show that by generally lumping all mercantilists together in the history of economic thought, and by reading them almost exclusively second hand - almost invariably filtered through the lenses of a neo-classical *Weltanschauung* - we have lost sight of a vast number of valuable insights into our own profession.

After the debate of the 1620's in England, the 'mechanical' views of Malynes, Locke and Newton were soon to win the day. In his *Principia Mathematica* Isaac Newton launched his attack on Leibniz in 1687. Locke's main attack followed in 1690, and was directed against Leibniz' neo-Platonist collaborators in Cambridge¹⁰², the most important of whom was Henry More (1614-1687). Perhaps the easiest way to understand this conflict is by seeing Leibniz and Wolff as defending the idealist tradition of the neo-Platonic Renaissance against

the attacks of the materialistic and mechanistic theories of the English and French Enlightenment. The severity of this conflict is reflected in a quote by Rupert Hall's standard work on the scientific revolution: '...no man of genius has ever mounted so unscrupulous campaign against an opponent as Newton organised against Leibniz.'¹⁰³

In the political sphere, this intellectual development had its counterpart in the 'glorious revolution of 1688', which brought William III the Dutch House of Orange to the English throne. John Kells Ingram, the Irish historian of economics, comments on the development of the science of economics resulting from this: 'In England, after the transaction of 1688, by which the government was consolidated on the double basis of aristocratic power and official orthodoxy, the state policy became not so much retrograde as stationary,.....there was for some time a noticeable check in the intellectual development, and Roscher and others have observed that, in economic studies particularly, the first three decades of the eighteenth century were a period of general stagnation, eclecticism for the most part taking the place of originality.'¹⁰⁴

Italy experienced a similar development as England. In Windelband's view, 'Italy was made dumb by the counter-reformation.'¹⁰⁵ There, one consequence of this was the failure to establish a nation-state. In Italy, town-mercantilism did not develop into national mercantilism for yet another 200 years. The connection between the absence of a nation-state and the absence of economic development in Italy is clearly pointed out by Friedrich List.

The Empiricist School reintroduced atomism and a mechanical world view, where the creative powers of Man lost their central part in the picture. Locke's empiricist tradition took over in the sphere of theoretical knowledge. In spite of this, in the long run English economic policy continued to be influenced by practical consideration, by vested interests, and by a practical view of steady progress materialising in machinery and science. Adam Smith's thesis of free trade did not have much practical influence during the first 100 years, and even then only when British vested interests suffered too much damage.¹⁰⁶ Practical policy was heavily influenced by practical men, who, like Andrew Ure¹⁰⁷ and Charles Babbage, saw the importance of technical change¹⁰⁸ and science¹⁰⁹.

The system developed into one where people like Babbage were listened to for domestic policies, and Smith and Ricardo were used for export. By this eclectic use of theory - by varying assumptions and theories according to the needs of England - both Babbage and Ricardo served England well. England shows that a mechanical and static economic theory will not do much harm a) as long as there is a steady supply of innovations, and b) as long as domestic policy-makers do not actually start believing in the static theory. England today, on the other hand, seems to be a country suffering simultaneously from a lack of innovations and from a political class which has come to embrace the static economic theory - where new ideas are irrelevant - as a 'natural law'.

6. Leibniz' and Wolff's system: Monads, duties and the holistic attitude to economics.

It is in the works of Cusa, Bruno, and Leibniz that one finds the modern holistic origins of German economic and social thought ¹¹⁰. This contrasts with the atomism of the English Enlightenment, and with both classical and neo-classical economic theory. The view of Cusa ¹¹¹, Bruno, Kepler, and Leibniz are Platonic rather than Aristotelian in their origin. They represent a world view of universal harmony, optimism and world joy. There was, as we shall see with Wolff, no

conflict between a rigid system of duties and *Lebensfreude* - the joy of living. In the spirit of the Renaissance, the search for knowledge now took place in the nature created by God in his image, rather than confined in the libraries. The objective of the school created by Leibniz and Wolff was to improve the standard of living and to create employment - 'to promote the happiness of Man'. This same objective, typical of the period, is contained in the title of one of Wolff's books: *Rational Thoughts on the Doings to be carried out by Men to promote their Happiness. Conveyed to Lovers of Truth by Christian Wolff.*¹¹²

To Cusa 'all substances are present in everything, that each thing therefore presents a microcosm, and yet that each has also its special principle of life and activity.'¹¹³ From this, Giordano Bruno developed a system where the world consisted of units, called monads. This system was further developed by Leibniz. To him each monad was essentially different, but they also reflect the wholeness, *die Ganzheit*. Monads were the immaterial substances which made up the world, and their main characteristic was energy or force. Monads are individual, indivisible, and spiritual power centres. They are closed and cannot communicate, except through God.¹¹⁴ Their force is constant, imperishable, and immortal. To Leibniz, and also to Wolff, there is a hierarchy of monads from passive and 'material' ones, to active and spiritual ones - the highest being God. They are compelled to act out their individual characteristics in a synchronised manner. Their actions correspond to each other in a harmony pre-established by God. This harmony also exists between the world of the monads and the world of the phenomena experienced by Man. This harmony of ruling principles constitutes the world order. The duty of man is to explore and gain understanding of these principles: A joyful duty to learn and educate.

This contrasts with the new English liberalist system of John Locke, in opposition to the earlier Cambridge School. In Locke's view the mind of Man at birth was a *tabula rasa*, a blank slate upon which experience imprinted 'bits' of knowledge. Locke did not believe in self-moving intuition or conceptions, principles of thought which Man carried with him from birth as innate ideas. Human thought occurs when the different experiences are combined into more complex ideas. This makes the thought process of Locke's followers, among them Adam Smith and the English classical economists, into a process of associative psychology only.¹¹⁵

Bluntly put, *passive sensations* are at the core of Locke's system. As Leibniz and Wolff sees it, Locke misunderstands the fundamental phenomenon of the mind, by attempting to find the basis of the mind in these passive impressions. To Leibniz and Wolff, the essence of the mind consists in *activity*, not in mere passivity.¹¹⁶ The nature of the mind lies in its active energy and in its fertility - in its capacity to produce an unending series of ideas. The ego, then, is not merely the scene of ideas, but rather the source and origin of ideas: 'The fountain and source of a prescribed law of things about to be created.'¹¹⁷ Leibniz sees the real perfection of Man's ego in this creative process: 'It is more perfect the more freely this production takes place.' The monadology also explains the existence of intuition, semiconscious monads, and opens up for what we today would call 'tacit knowledge'. The greater the force of the monad, the more fertile the mind and the more prolific the production of ideas. The creative production of a multitude of ideas originates in the freedom and unity of a monad/mind, and therefore in harmony. This harmony creates order and beauty, which in their turn awakens love and joy. Out of this comes Man's inclination to do good, his virtue. Will and reason interact to create happiness, 'an ever-enduring progress in wisdom and virtue...'

As we shall see more clearly when discussing Wolff, in the Plato-Leibniz-Wolff-tradition public wealth is created by a system of 'private virtues'. This, of course, contrasts fundamentally with the classical and neo-classical tradition, based on Mandeville-Smith, that the essential wealth-producing mechanism of our economic system is a process by which *private vices* are converted into *public benefits*, i.e. 'we owe our daily bread to the greed of the baker, not to his kindness'. In the Mandeville-Smith tradition, society, to the extent that this exists, is balanced through a system of 'countervailing self-interests' (or greediness). In the Leibniz-Wolff tradition, society is in balance due to an innate human consensus - *consensus gentium* - and through legislation and governmental intervention. This *consensus gentium* was based on principles and patterns of thought which originated with Plato's dialogue 'Meno'.¹¹⁸ In Europe the *consensus gentium* was important to the 15th Century Nicholas of Cusa and to Italy's Florentine Renaissance. This system continued with the late 17th Century Platonist School in Cambridge. It is first of all the adherents of this *consensus gentium* who come under the attack of John Locke in 1690. In the *consensus gentium* tradition, the difference between men and animals rests in Man's innate ability to think and communicate, based on abstract principles, which are shared by all men. These abstract ideas form the basis of morality according to the neo-Platonic tradition; the skilful ability to distinguish between right and wrong¹¹⁹. In present-day economics, of course, 'right' and 'wrong' are phenomena which are totally external to the system.

Although our emphasis is on new knowledge as it relates to technical inventions and economic growth, other, equally important, aspects should also be noticed. The religious-philosophical gestalt-switch liberated all human endeavour: The sciences, explorations, poetry, drama, and all the visual arts. The liberation came in a sequence where, from its Italian origins, the center of gravity of the Renaissance moved from Florence, to Cambridge and Paris, and then to Halle in Germany. Dante, Columbus, Leonardo da Vinci, Michelangelo, Drake, Shakespeare, Goethe, and Schiller were all products of the same liberating force of the new philosophy and theology.

7. Man's will, invention, and creativity in Wolff's 'System of Duties'.

Wolff laid the foundations on which the German Historical school of economics was to build. Unfortunately, Wolff's system comes in a packaging which is neither easily accessible nor immediately attractive to a modern person. It was basically intended for reading aloud to the general public of the period.

- 'None of these (Wolff's) books is small or particularly delightful to read. In reading them, one cannot forget Wolff's definition of the 'German Logic': *'When a book is prolix. If more of already known things is presented than is required by the purpose of the book, then the book contains superfluous things in it. Then it is prolix.'* He illustrates what needs no illustration. He proves (often by proofs so invalid that the fastidious reader may squirm) what needs no proof and what admits no proof. He defines what needs no definition. He cites, by elaborate cross-references, his other works, which all too often are found not to elucidate the passages in question but to be almost equivalent to it. He moves with glacial celerity. He ruthlessly bores.¹²⁰

This is a rather harsh judgement of Wolff. No doubt he is repetitive, but in our view his seemingly unnecessary definitions and proofs do contain some real gems. The narrative is carried forward by these definitions, rather than by analysis. Wolff's books are among the first best-selling non-religious texts. They were written as teaching texts, and were also used for spoken delivery. As a

consequence, there is an emphasis on repetition. We would certainly agree with Keith Tribe, who, when discussing the Wolffian system, states that the style 'presents both a limitation and an opportunity. In the past it has been the limitation that has usually prevailed; perhaps it is now time to explore the opportunity.'¹²¹

Below we shall discuss the role of innovation and creativity as essential duties of Man, as these are outlined by Wolff in his *Rational Thoughts on the Doings to be carried out by Men to promote their Happiness. Conveyed to Lovers of Truth by Christian Wolff*, based on the 6th edition published in 1739.¹²²References will be made according to the system of paragraphs employed by Wolff. The book contains more than 1.000 such paragraphs. We have tried to translate paragraphs which are representative for Wolff's view of economic evolution, innovation, science, and invention. Without sacrificing his style completely, we have tried to render Wolff's ideas in a readable English.

Reading Wolff continuously brings to mind flashbacks from the huge reservoir of German *Sprichwörter*, or aphorisms. It is as if as these aphorisms, the foundations of our stereotype of the German character, were a product of a distillation process carried out in order to present the essence of Wolff's work.¹²³ Here we find the roots of *Gründlichkeit* and tenacity. We also find an elucidation of the importance of learning-by-observing and learning-by-doing, i.e. of the philosophy which underlies the German apprentice system. Wolff was not only a highly respected scientist internationally, he was the *educator of the German people*. Wolff's is a science which carries the German high distinction of being *Praxisnah*, or near to practical life and reality. When business people today criticise mainstream economic theory, what they in effect do, is to point out that this theory is not sufficiently *Praxisnah* to be useful.

Wolff's world view, as we shall see, strongly indicates the presence of cumulateness and path dependency. Here we also find the rationale behind the refusal of the German Historical School of economics to separate 'economic man' from the wholeness of Man. We learn in Wolff that accumulating wealth is only one part of Man's desires, accumulating knowledge is another desire which to many individuals is more enjoyable than accumulating wealth.

Although Christian Wolff's world view is clearly evolutionary, his system of duties as the basis for social organization clearly also puts him in Sombart's category of *richtende Nationalökonomie*, economics as a normative science based on what 'ought to be'. It is therefore useful to compare Wolff's system briefly with other 'duty-based' - *richtende* - economic systems. In Wolff's system, one recognises the three parts which, in Sombart's view, characterises *richtende* (normative) economic systems:¹²⁴

- 1) Insight into the final values (in Wolff's case: perfection of Man's knowledge)
- 2) Knowledge of the right means to achieve this (Wolff: a system of duties)
- 3) Appealing to the will to take the 'right' actions (Wolff: act to maximize learning)

As result of the discoveries, there seems to have been a great interest in alternative economic systems in Wolff's times. We have already commented on the interest in China, and on the role of utopias. It should be noted that probably the largest economy ever to be built exclusively on a *system of duties* - with the complete absence both of money and markets - was Tahuantinsuyo, or the Inca Empire. The important German cameralist economist Johann Gottlob von Justi published, in 1762, a book containing a long chapter on the organisation of the Inca Empire.¹²⁵ We should also mention Wolff's similarity to a

modern duty-based system, which also consciously tried to abolish all traces of a market system. In *Rational Thoughts*, Wolff draws a picture of Man which brings into memory the 'New Man' from Marx through to Ernesto 'Che' Guevara's 'Hombre Nuevo'. The New Man is - similarly with Wolff's Man as he is depicted in this book - moved by moral force. But, Wolff's Man lives in a society with checks and bounds in addition to the purely moral ones; e.g. market relations and its legal system, explicitly including private property.

In our translations, we have emphasized the role of learning, education and innovation. However, in the same book Wolff explains the necessity of the institutions of a market-based society - private property, money, credit, rent, interest, etc. - and the *normative relations* between them. Chapter 3 of the book - On Man's duties in Relationship to Property, he starts out by explaining the need for private property, why a community of goods is impracticable. (Paragraph 887, see below).

In the first two paragraphs of these *Rational Thoughts* (there are other books by him with similar titles) Wolff portrays a world where Man's free will is faced with 'the decision of choosing the things which please us'. This freedom rests in Man's will or choice. Decisions are necessary, and they are the essential cause of change. The decisions will either improve or worsen Man's internal or external perfection. These paragraphs convey a picture of life as being a product of decisions - of both human life and human history as being the outcome of gigantic 'decision trees'.

'When deciding whether a decision or an act is good or bad, it is necessary to study its consequences'(No. 4). 'The basic rule to follow when making the decisions which are in our power to make, is: Do what makes your own condition, or that of others, more perfect. Refrain from doing what makes these conditions less perfect.'

'A rule, after which we are obliged to subjugate the decisions of our free will, is called a Law' (16). 'A rule is called a Law of Nature when nature obliges us to adjust our actions according to this law...(17).

'Nature requires us to do what makes us and our conditions more perfect' (19). In other words, it is our **duty to Nature** to make the best possible decisions. We have a responsibility towards 'das Ganze' - this is not a matter of personal decision. If we do not make the best decisions, the consequences are not ours alone. Like a monad, we are unique, but also a reflection of the totality.

In the next paragraph, Wolff specifies that our duties originate in Nature. Somewhat surprisingly for his time, he continues to state that these duties would exist 'even if there were no God.'(20) Being part of the whole, whether we believe in God or not, gives us to duties towards ourselves and towards Mankind.

Paragraph 29 contains a very clear statement that 'Man and his conditions, either of perfection or imperfection, depend on their free acts'. Man basically holds the key to his own destiny, and his situation is a result of his own past decisions.

'The judge as to whether our deeds are good or bad is called Conscience...(73). 'For this (judgement, Man needs) an insight into the connections between the truths'....'Man has a conscience because he is able to reason'(90)

'Nature demands that Man do what makes his situation more perfect, and refrains from doing what does him and said situation less perfect.' Wolff goes on to explain

three acts of duty: to perfect our soul, to perfect our body, and to perfect our outward condition (224). Man is taught to learn to understand his potential, and to 'find' his body, his soul and his condition (228).

To achieve this knowledge, Man has to study his fellow Man (229). It is Man's duty to find himself, but the way to achieve this *is to care about his fellow Man*. This concern is also a duty (230).

'Not everyone has the ability to invent. Man shall **not** only take care of himself, but also of others. Therefore, those whom GOD has given powers and possibilities to invent, have the duty to perform this work in the interest of others, and to inform others in writing,.....(233)..and through education' (235).

Gaining the necessary knowledge requires great diligence and thoroughness. Wolff makes it clear that sitting back, thinking that we have reached perfection, is not accepted. He warns against complacency (237). Here, as in many other paragraphs below, we get to know the Wolff who is considered the father of German thoroughness - 'Gründlichkeit'.

'As children, and others with similar intellectual capacity, will take after what they see in others,...., it is recommendable immediately to teach the children to notice what other people make and do, and to repeat the good, but refrain from the evil, which they may notice with others.....To this belongs that once a child has been decided (to a profession), immediately to set up as an example for him, a person who has done very well in this (same) profession'.(238). Here is the reasoning behind the German apprentice system, which is generally so much admired.

'To the three kinds of duties (see 224) correspond three kinds of good things: The good things of the mind, the good things of the body, and the good things of pleasure.' (242) We have the duty to strive for these good things. In other words, it is a *duty* to seek pleasure (243). As a foundation for German social sciences, Wolff presents us with a world view which is the opposite of the 'dismal science'. Life is not a zero-sum game. At the core of the mechanisms which increase the size of the pie, we find **creativity and inventiveness - not barter**.

In the appendix, we let Wolff elaborate on his own system of Man's duties to create and invent. The excerpts have been chosen with a view to illustrate Wolff as a precursor of evolutionary economics, with particular emphasis on his view of learning. In Wolff we find a view of history being propelled by the creation of new knowledge - in other words by **innovation**. Learning - changes in the level of knowledge - takes place through hypothesising and observing, but one finds other forms of learning, what we today would call learning-by-doing, learning-by-interaction, and learning-by-observing. To Wolff, the creation of knowledge is cumulative, and his world is also path-dependent. However, in contrast to modern evolutionary economics inspired by biological evolution, **human will** and **morality** plays the crucial role in Wolff's system. In a Wolffian perspective, modern evolutionary economics in this sense carries with it much of the mechanistic world view of neo-classical economics. Both neo-classical, and much of evolutionary economics, are examples of what 19th Century German economists criticised as *die Entgeistung der Volkswirtschaft* - that the **human mind** had been left of economic science.

8. Conclusion. Understanding Growth: Wolff and the duty to venture beyond a barter-centered economic theory.

In this paper we have attempted to draw long parallel lines of two alternative theoretical traditions in the history of economic thought. The two lines are based on fundamentally different *Weltanschauungen*. The lines can be traced back to the period when the term economics was first used, to ancient Greece. One of these traditions is mechanistic and barter-centered, the other dynamic and production-centered. The first tradition belongs to what Werner Sombart calls *ordnende Nationalökonomie*, which is concerned about *organising* the economic sphere. The second tradition is what Sombart calls *verstehende Nationalökonomie*¹²⁶ - what Nelson and Winter refers to as *appreciative economics*.¹²⁷ The first explains Man's economic activities in terms of physics (dead matter), the second in terms of biology (living matter). The two complement each other, one emphasizing *barter* and exchange of goods and services, the other their *creation* and production.

We have tried to show that a switch from a static, passive, and mechanical world view to an organic, active, and creative one, is a necessary precondition for economic growth. We would also argue that an understanding of the causes of uneven distribution of wealth - locally or on a world scale - can only come from studying the differing conditions and levels of knowledge present in the dynamic *production* of goods and services, not in the sphere of barter and exchange. It is argued that our present failure to understand economic growth - and particularly the uneven spread of this growth - is a consequence of a world economic system almost exclusively based on a static *theory of barter and consumption*.

As we quoted initially - to Adam Smith the basic difference between Man and beast was Man's propensity to barter. Smith illustrates the difference between Man and beast by pointing out that no one has ever seen two dogs deliberately exchange bones. In our opinion, the fundamental failure of neo-classical economic theory in capturing the essence of economic growth, rests precisely in this barter-centered world view. Today's economic theory carries with it this dead-weight from Adam Smith and his intellectual predecessors, the French physiocrats. Theory essentially fails to understand the mechanisms which bring new 'bones' - very unevenly - into the system.

This is not to say that barter and markets are unimportant, to the contrary. But understanding economic growth requires a conception of the economy that goes well beyond the understanding of the more and less visible hands which operate in the marketplace. To follow up on Adam Smith's own example: What if we managed to teach dogs how to barter and enter into contracts? Would this in any way change economic growth among dogs by increasing world production of bones? Of course not, nor are we indicating that Adam Smith thought it would. In Adam Smith and the classical economists in general there is an underlying assumption of 'the tendency of things to improve' which, to Smith, was driven by 'the division of labour'. But, little curiosity is shown in investigating the causes of this tendency to improve. It is taken for granted, much as a steady supply of innovations was taken for granted after WW II. We have argued that Smith's 'division of labour' is a result of human ideas, a by-product of the fixed costs and specialisation associated with technological change. Economics has failed to formalise this most central of Smith's ideas - the division of labour is not part of today's economic theory¹²⁸.

Income differentials between nations - just like inside nations - seem largely to be a result of different types of knowledge commanding different market prices. Efficiency *per se* seems to be relatively unimportant in explaining differentials in income. The difference in income between a medical doctor and a person washing dishes, is explained by the different value the market puts on their knowledge. The most efficient dishwasher earns only a fraction of the income earned by a mediocre doctor. Consequently a nation exporting dishwashing services will be much poorer than a nation exporting medical services.

We have argued that this kind of intuitive understanding was an important basis for pre-Ricardian economic policy. Herein lies the fundamental difference in the industrial policies emerging from the mechanical - *organising* - and the organic - *understanding* - school of economics. The organic and learning-based tradition will see economic development essentially as a shift into activities where learning is 'focused'¹²⁹ at any particular time. This was the basis for the industrial policy of the Republic of Venice, of England starting under Henry VII in 1485, of France under Louis XI and later Colbert, of Germany and the United States, and later of Japan and Korea. A mechanical and barter-centered theory, as in the neo-classical tradition, will only measure the *effects* of new ideas and of learning as they are translated into 'capital accumulation' - thereby *fundamentally inverting causes and effects* of the process of growth.

By seeing the learning process only as a process of accumulation of 'human capital', mainstream theory loses an important point: Human capital is only of measurable value where a technological 'window-of-opportunity' - a new idea - creates a demand for this knowledge. Where human capital is accumulated without the demand for knowledge, which is essentially created by new ideas, the result is unemployment and/or a 'brain drain'. Since new ideas and learning at any time will be focused in relatively few activities, economic development is an *activity-specific* process¹³⁰. The supply of knowledge must be met by a demand for such knowledge, in the same way that the supply of capital has to be matched with a demand for capital generated by new ideas. This will be discussed in the next paragraph.

The tension between the mechanical and the creative view of the economic system can be expressed in various ways. The creative view can be labelled 'industrialism', the mechanical one 'financial capitalism'. 'Productive capitalism' will, by the weight of its own success, slowly be transformed into 'financial capitalism'. The decline of nations can be attributed to an excess of 'financial capitalism'(capital) in relationship to the flow new ideas (innovations) which is the propellant of 'industrialism'. As societies mature, more direct government effort is needed to channel investments back into production. This is made difficult, as the political power will have passed slowly to those protecting the vested interests of the financial institutions. Thus, the financial market which was needed to serve production, becomes itself the center of the economy; 'the tail wagging the dog'. Slowly, the lack of investment opportunities resulting from disregarding innovations in the non-financial sector, will erode the basis also for the financial capitalism, leading to massive capital flight.

William Lazonick ties the decline of the economic performance of the United States to an excess of 'Value Extraction' ('financial capitalism') compared to 'Value Creation' ('industrialism').¹³¹ Michael Porter, in a little-quoted part of his latest book, expresses similar thoughts: Economic decline starts when a society moves from an 'innovation-driven' stage - we could have said 'idea-driven'('industrialism') - to a 'wealth-driven' stage ('financial capitalism')¹³². The ill-defined concept of 'competitiveness' also conceals industrialism's search for the dynamic imperfect competition which accompanies innovations¹³³. Since the

creative process - new ideas as the moving force - is absent in standard economic theory, these concepts unfortunately makes little sense in the framework of economic theory today.

The creation-centered economics of Christian Wolff seems to move the economics profession into metaphysics. We are presented with a world where economic progress is achieved through a process where Mankind climbs a hierarchy of 'monads' towards ever higher levels of understanding and of knowledge. However, we would like to point out that there is something decidedly metaphysical also about the Mandeville-Smith-neoclassical tradition, where the process of knowledge creation and growth essentially is one where 'private vices' ('greed') is automatically converted into 'public virtues' ('economic growth'). In Wolff's system, 'private virtues' are transformed into 'public virtues', in a process which, on that level, is clearly more rational and straightforward and less metaphysical than the neo-classical alternative.

Christian Wolff represents an economic tradition which, compared to neo-classical economics, is situated at the other extreme of an imaginary axis going from 'creativity only' to 'barter only' as the moving forces of the economic processes. To Wolff creativity is at the center; barter and commerce are a necessary consequence of creativity and production. In today's mainstream theory, barter is at the center, and creativity is totally absent. The human mind is nowhere present - economic theory suffers from *Entgeistung*.

The English classical economists focused on the incentives of the market place as an external driving force for man. Wolff, although acutely aware of the role of markets and contracts, emphasises Man's inner drive for learning, creating, and innovating. To Wolff, Man is not just an 'economic man' - as in the neo-classical tradition - but he is *also* an 'economic man'. We would argue that - in order to understand the *knowledge-based society* - time has come to focus again on the Wolffian tradition.

Appendix:
Excerpts from Wolff's *Rational Thoughts on the Doings to be carried out by Men to promote their Happiness.*

References are, in the customary tradition, to paragraphs.

247 - 'As neither Nature nor GOD can oblige us to something impossible, we are not obliged to accomplish the Good Things which are not in our power...

248 - 'But we must not say that something is not in our power, until we can prove it. Confusion in this area is very dangerous. He who holds, that something is not in his power, he does not make sufficient effort, and thus his progress towards higher perfection will be hindered, and he will not come to possess the Highest Good, which could have been within his reach on Earth. For example, it was believed that it was not in our power to develop the sciences and the arts beyond the point to which the ancient Greeks had brought them, but (only to continue to reinterpret them), and not to add any new knowledge. Therefore the rise of the sciences has been hindered, which otherwise could have been furthered the many brilliant heads, who have been limited by these preconceived judgements.'

249 - 'Thus, as long as we are not completely convinced that something lies not within our power, we must employ our full powers in order to achieve it...But if it is possible, it will cause us even more joy, that we were not discouraged by the difficulties we encountered. We must not doubt our own abilities, until tried and tried again and not succeeded.'

250 - 'And this practice will strengthen us from day to day, so that we do not immediately lose courage in the face of failure but persevere....And from experience comes the saying of the ancients: nothing is too difficult for he who attempts it.'

251 - 'He who tries to gain what is good, and flee what is evil... Therefore one is freed from regret and shame, two contradictory afflictions, ...and one can assure oneself that God, who has created the Heavens and the Earth for his intentions, has also allowed the contradictions afflicting him, to exist as a means to good.'

252 . 'On the other hand, when one immediately doubts one's own powers and dares nothing, but thus distorts good or contracts some disadvantage, one must blame oneself, when one later realises that it lay within one's grasp to gain what is good and avoid disadvantages. When one is now convinced by experience that it has been within our powers to sustain good and avoid disadvantage, one realises that one has done wrong, and conscience accuses us. Consequently, as the accusations of conscience bring discomfort, so one experiences discomfort. But how difficult this discomfort is to cure, and how difficult it is to calm the contradictory afflictions, has already been ascertained above (113).'

253 - 'We come now to the strange duties of Man, and consider first the duties to the soul, the obligations Man has in regards to his **soul**. We find, in the soul, both reason and will. Therefore we must examine that which Man is obliged to both in regards to his **reason** and his **will**. We begin with reason, for will is derived from it.'

254 - '**Reason** is a force in the soul whereby the possible is clearly envisioned. As reason is more perfect, the more clearly it can envision things, so are we, in

regards to our reason, obliged to do all that which increases the number and clarity of envisioned things, and to ignore that which can hinder them.'

255 - 'As we are obliged to yearn that our **reason** be able to envision more and more things, we must never ignore the opportunity to understand or learn something, and thus pursue as much knowledge as our circumstances permit.'

256 - 'When the chance arises to learn many different things, but lack of time or resources makes it impossible for us to acquire all this knowledge, it is obvious that one must prefer one for the other. As every human being chooses a certain way of life...he must prefer the knowledge which benefits those transactions he will undertake according to his way of life, and thus he errs when he prefers the other, from which he can not expect such benefit.'

257 - 'This does in no way excuse those who ignore or reject knowledge only because they believe it is of no gain to them in the profession they themselves have chosen or are skilled in: for this excuse is valid only in the circumstances where one, to learn the important, must set aside other concerns, but in no way in those circumstances where resources are sufficient .'

258 - 'He who in such a manner excuses himself in those circumstances where resources do not preclude it, one must show by example how unexpected situations could arise in his life, where knowledge of something could not only be of benefit, but even crucial, ...'

259 - 'It even happens, that Man deludes himself in the matter of whether a knowledge is useful to his profession or not. He could, in his delusion, take for useless that which to him is most important. For he who believes it important not to ignore any knowledge that could be of use to him, will, as long as he is in doubt, rather take the safe path, ..., since it is not harmful for him to have learned something useless without ignoring the necessary, whereas it most certainly is harmful for him to refrain from learning something that could be of benefit to him.'

269 - 'In truth, Man is not obliged to any knowledge beyond that which is made possible by his capacities; but one must take great care, when in unusual cases one is to judge whether our powers are sufficient for a knowledge or not. One must first try, and, as a skill comes with training, and training consists of the repetition of an action, keep trying... But as it is easiest to move Man by example, it is often beneficial to show him how lesser people have come to the same knowledge.'

261 - 'It is also true that Man is not obliged to acquire a knowledge which is not required by his circumstances, that is, if time or resources do not permit its acquisition...'

284 - 'The thoroughness of knowledge is based on the clarity of conclusions. Clarity of conclusions is a perfection of reason, and thus thorough knowledge is one of the perfections of reason. As Man is obliged to seek the perfection of reason it is also his duty to acquire thorough knowledge.'

293 - 'The ability to prove what one claims is called science. Seeing as Man is obliged to seek thorough knowledge, he is also *under an obligation to science*.'

294 - '....This ability to draw unknown truths from those already known, is called the art of invention.'¹³⁴

295 - 'There is another way to show why one has the obligation to seek the art of invention...As no human being should doubt that more knowledge is produced where the art of invention is present than where it is not, everyone must admit that the art of invention should be sought with the greatest intensity. One sees how much more progress has been made in the sciences today, practising the art of invention, than in the past, when one only learned what others had invented...'

296 - '...It is possible to uncover hidden truths in two ways, either by experience or by reason; for in these two ways all knowledge of truth is acquired. He who seeks to invent only by experience, must observe what happens in the world and attempt much in many different ways, until finally something is brought to light. He who seeks to uncover by reason must, from correct deduction of accepted truths, extract others that are connected to these. For reason is an insight into the relations between truths, and conclusions bare these relations for the eye to see.'

297 - 'He who seeks to uncover truths through experience is served by his mental acumen. He must also be articulate as well as able to concentrate his thoughts. ...The difference between experience and experimentation I have explained elsewhere. By experience, nature brings things and events to light, without our conscious effort, whereas in experimentation we must help nature, or it would not uncover anything...'

298 - 'One trains oneself in the art of experience when one imagines the diligence others have shown in this area, for thus we acquire a conception of the art they have mastered and the methods they have employed to extract truths from the observation of nature. By imitating these methods, day by day we become skilled in the comprehension others have shown in observing the course of natural events, and the application of this in similar cases... If we find that the other has shown an acumen we lack, we must investigate why the other noticed what we did not. This shall give us a rule we will be able to apply in other situations....'

299 - 'Nowhere has the art of experience been brought further than in the field of Astronomy.'

303 - '...One can reach this goal when one practises invention: something which is done by investigating the inventions of others and the techniques they have used, and following them in similar cases...'

306 - 'However, as new truth can not be invented except where it comes from familiar, known truths, so he who seeks to acquire the art of invention must familiarise himself with as many previous inventions as possible. The more truths are known, the more can be invented, when one possesses the skills which are necessary to invent. The truths one knows are comparable to the materials that are necessary for a work...'

307 - 'It is also known that the strange rules of the art of invention are based on the experience of things, and could not be understood before many truths were uncovered and invented. So must he who for a class of truths seeks to gain the art of invention familiarise himself with all that which has been invented, but also consider how these truths have been derived according to the common rules, and how later on strange rules have been derived from the invented truths, how Man has been, and still is, able to continue...'

309 - 'Wit is an ease in finding similarities. Thus, that which enables us to see the similarity more easily brings us to greater wit...'

310 - '...And he who in this manner seeks wit, will by his wit also prove reason...'

311 - 'But it also often happens that things share a similarity, but that it is lost among other, more obvious similarities.'

313 - 'We can also still in a normal manner prove that Man is obliged to acumen, skill at conclusions and thoroughness, the art of invention, wit, the art of experience, linguistics and all that which belongs to these perfections.'

314 - 'And thus science is a means to wisdom. Therefore we are obliged to wisdom, and in a new manner it is thus proved that we are obliged to science.'

317 - 'It is true that the greater part of humanity always, and all humans very often in such cases make use of expectations rather than science, (and) must also make use of this for lack of knowledge...'

345 - 'If one knows love of truth, and specifically also hungers after a science, it is plainly visible in the great joy he exhibits when it is spoken of : for he who loves a class of truths takes pleasure thereof...'

349 - 'Happiness and joy over truths as yet unknown are proof of a great devotion to the growth of science. For this is proof of a great love of truth, but the devotion stems from love. He who loves truths seeks to accumulate them, like the one who loves money seeks to hoard it.'

351 - 'That which at one time challenged divine intellect, may at another time, when progress has been made in the knowledge of truth and more techniques are known, be childishly simple.'

352 - 'As one can now judge the art of invention by the method by which the invention is arrived at, so one must here make a distinction between what is arrived at by experimentation, and what is arrived at by wit and reason...'

355 - 'If one had an accurate history of the sciences,¹³⁵ and of the men whose merit it is that they flourished, from all periods of history, it would serve not only to show the usefulness of the art of invention, but it would prove to be of much greater value. It would serve to firmly improve the reputation of the art of invention, through the truths thereby revealed, through the rules of the art of invention which one also would reveal, (In this way) one would know how much truth so far had been invented, and what was still missing, and thereby avoid wasting time and effort in seeking what was already known. This history would have to show how much light, and knowledge of truth, has been present in the world at any time.... One easily sees that such a history is not the work of one man, but many people must work with common efforts for a long time to create, and therefore I have referred them to the Academies of Science.'

664 - 'One can know the perfection of God by observing nature in two ways, either by only noticing what happens in nature, i.e. through **Natural History**, or by scrutinising the causes of what happens, i.e. through **Natural Science**...

665 - 'As no one promotes the glory of God but for he who knows his perfections, so is ignorance of God and his qualities a hindrance to the obligations to God...'

767 - 'Man is obliged to perfect not only himself and his own condition, but also other humans and their conditions. And thus is he obliged to all those things whereby his and others' conditions may be perfected'

768 - '...The obligations to others are the same as the obligations to oneself...'

880 - 'The condition of Man where no one offends the other is called peace.'

887 - 'People with a community of property, would all have to be reasonable and love themselves as they love each other, sincerely. But, since it is not possible, that all men be of this predisposition, but experience unfortunately ! (sic) tells us, how many are prone to vices, in such a way that some would only waste and not produce, others would see themselves superior to others and want to be more than the others are, others again would only seek make damage, and so forth. Therefore it is not possible to have the property that one uses for the necessities and conveniences of life in communal property. The communal property is more difficult the larger the population is, which lives in the same place, and the more affluent their way of life. The community of goods can only exist among those who love each other sincerely, and are of one mind. In other cases, not only will it produce utter disorder, but also give occasion to insults.'

936 - 'As we are obliged to help anyone to what he cannot reach without our help, so are we also obliged to share of our surplus with anyone in need. However, as no one can demand of us what he can reach on his own, we can demand it back when he is able to return it....'

¹ The most comprehensive work on the history of evolutionary economics is contained in Hodgson, Geoffrey M., *Economics and Evolution, Bringing Life Back into Economics*, Cambridge, Polity Press, 1993. Early reference points to evolutionary economics are normally the quote that 'the Mecca of the economist lies in economic biology' appearing in the 7th edition of Alfred Marshall's *Principles of Economics*, (London, Macmillan, 1907) and the 1898 article by Thorstein Veblen 'Why is Economics not an Evolutionary Science' (*The Quarterly Journal of Economics*, vol. xii, July 1898, reprinted in Veblen, *The Place of Science in Modern Civilisation and other Essays*, New York, Huebsch, 1919.)

² This point is discussed in Nelson, Richard, 'Recent Evolutionary Theorizing About Economic Change', in *The Journal of Economic Literature*, Vol. XXXIII, No. 1, March 1995, pp. 58-59.

³ Hodgson, *op.cit.*, p. 149.

⁴ For a discussion of this, see chapter 5 below.

⁵ See Perez, Carlota, 'Structural Change and the Assimilation of New Technologies in the Economic and Social System', in *Futures*, Vol. 15, 1983, No. 4, pp. 357-375, Freeman, 'The Nature of Innovation and the Evolution of the Productive System', in *Technology and Productivity. The Challenge for Economic Policy*, Paris, OECD, 1991.

⁶ This Kuhnian movement between formalism and revolutions has been the historically observed pattern, where the 'creative bursts' are natural consequences of excessive formalism.

⁷ Lionel Robbins in *The Theory of Economic Policy in English Classical Economy*, London, Macmillan, 1952, claims that the excessive formalisation of the classical economists in neo-classical economics create an artificial 'Harmonielehre'.

⁸ Paul Samuelson (1949 and 1950) proved that, under the standard assumptions of neo-classical theory, perfect information and no increasing returns to scale,

the world would achieve *factor-price equalisation* - i.e. everybody would be equally rich - if the world was only opened to free trade.

⁹ Anners, Erik, *Den europeiske rettens historie*, Oslo, Universitetsforlaget, 1983.

¹⁰ Windelband, Wilhelm, *A History of Philosophy*, (1893), Westport, Conn., Greenwood Press, 1979, p. 444.

¹¹ Marshall, Alfred, *Principles of Economics*, London, Macmillan, 1890, p. iv.

¹² Serra, Antonio, *Breve trattato delle cause che possono far abbondare li regni d'oro e argento dove non sono miniere*, Napoli, Lazzaro Scoriggio, 1613.

¹³ Marshall, *op.cit.*, pp. 315-316.

¹⁴ This problem is discussed in Hart, Neil, 'Increasing returns and economic theory: Marshall's reconciliation problem', University of Western Sydney, *Discussion Paper Series*, No. E9004, 1990.

¹⁵ Krugman, Paul, *Rethinking International Trade*, Cambridge, Mass., MIT Press, 1990, p. 4. It is interesting to note Krugman's view of economics as path-dependent, a concept which is otherwise foreign to the theoretical tradition he represents.

¹⁶ Kuhn, Thomas, *The Structure of Scientific Revolutions*, 2nd Edition, Chicago, University of Chicago Press, 1970.

¹⁷ We would tend to attribute this lack of interest to a basic complacency with the situation in the industrialized world at the time. This led to a lack of demand for alternative explanations. Clearly, the theoretical development was also influenced by the cold war. In this period, theories showing the perfection of the market system were most welcome. The theoretical development proceeded down a path created by the choice of methodology and tools made by economists in the late 19th Century. Thereby one symptom and necessary companion of growth - capital accumulation - was mistaken for its true cause. Searching for the sources of growth was not in the natural 'path' of this theory, which was essentially centered around barter, exchange, and equilibrium.

¹⁸ According to List, the fundamental problem here was that Smith's system was a theory of *exchange*, and not of *production*. See e.g. List, Friedrich, *The National System of Political Economy*, London, Longman's Green & Co., 1885, p. 137.

¹⁹ 'Explaining the mystery', January 4th, 1992, p. 17.

²⁰ Abramowitz, Moses 'Sources of ignorance, old and new', *Journal of Economic History*, March 1993.

²¹ Schumpeter, Joseph A., *History of Economic Analysis*, New York, Oxford University Press, 1954, p. 468.

²² Cambridge, Cambridge University Press, 1969.

²³ Lundvall, Bengt-Åke (ed.), *National Systems of Innovation*, London, Pinter, 1992, and Nelson, Richard (ed.), *National Innovation Systems*, New York, Oxford University Press, 1993.

²⁴ OECD, *Technology and Productivity. The Challenge for Economic Policy*, Paris, OECD, 1991, and *Technology and the Economy. The Key Relationships*, Paris, OECD, 1992.

²⁵ See e.g. Lundvall, Bengt-Åke, 'The Learning Economy - Challenges to Economic Theory and Policy', paper presented at the EAEPE Conference in Copenhagen, October 1994.

²⁶ Barro, Robert J. and Xavier Sala-i-Martin, *Economic Growth*, New York, McGraw-Hill, 1995. p. xvi. What in the static neo-classical framework is referred to as 'Accumulation of knowledge', is what we would call 'learning'.

²⁷ Christian Wolff's contributions to the philosophy of law were of utmost importance. This matter is not raised in this paper.

²⁸ This is Moses Abramowitz' term.

²⁹ Stated at a seminar at the University of Oslo, May 16, 1995.

³⁰ *Ekonomi och Religion*, KF:s Bokförlag, Stockholm, 1957.

³¹ *Die Juden und das Wirtschaftsleben*, Leipzig, Duncker & Humblot, 1911.

³² Tawney, Richard, *Religion and the Rise of Capitalism; A Historical Study*, London, J. Murray, 1926.

³³ This is discussed in Cassirer, Ernst, *The Platonic Renaissance in England* (1932), New York, Gordian Press, 1970, and in Venturi, Franco, *Italy and the Enlightenment. Studies in a Cosmopolitan Century*, New York, New York University Press, 1972.

³⁴ This refers to the influx of neo-Platonists to the Florentine Academy, see Windelband, Wilhelm, *A History of Philosophy*, (1893), Westport, Conn., Greenwood Press, 1979, p. 359

³⁵ Windelband, Wilhelm, *op. cit.*, p. 108-109.

³⁶ See Plato, *Phaedo*, Translated with an Introduction and Commentary by R Hackforth, Cambridge, Cambridge University Press, 1972, especially 97c to 108c in the Greek pagination, and his *Parmenides*, Translated into English and with an Introduction by A.E. Taylor, Oxford, Clarendon Press, 1934, 132b to 136e, and 'Epistle VII', in *Plato, with an English Translation*, Vol VII, (edited by R.G. Bury), Loeb Classical Library, London, Heinemann 1929, 342b to 344d. See also Cornford, F.M., *Plato's Theory of Knowledge*, London, Routledge, 1935.

³⁷ The first clear statement of this is found in John Rae's *Statement of some New Principles on the Subject of Political Economy*, Boston, Hilliard Gray, 1834.

³⁸ Smith, E. Peshine, *A Manual of Political Economy*, New York, Putnam, 1853.

³⁹ Cambridge, Mass., Harvard University Press, 1982.

⁴⁰ 'The Influence of German and Austrian Economics on Joseph A. Schumpeter', in Shinoya, Yuichi and Mark Perlman, *Schumpeter in the History of Ideas*, Ann Arbor, University of Michigan Press, 1994.

⁴¹ Cambridge, Cambridge University Press, 1989, see also De Marchi, Neil (editor), *Non-natural Social Science: Reflecting on the Enterprise of 'More Heat than Light'*, Durham, Duke University Press, 1993.

⁴² Mirowski, Philip, *Natural Images in Economic Thought*, Cambridge, Cambridge University Press, 1994.

⁴³ '...the great name of Leibniz and that of his faithful henchman, Christian Wolff'. Quoted from Schumpeter, Joseph Alois, *History of Economic Analysis*, New York, Oxford University Press, 1954, p. 117.

⁴⁴ Adam Smith sees the division of labour to be caused by the propensity to barter: '(The propensity to barter) is common to all men, and to be found in no other race of animals, which seem to know neither this nor any species of contracts....Nobody ever saw a dog make a fair and deliberate exchange of one bone for another with another dog.' *Wealth of Nations, op. cit.*, p. 17. In evolutionary terms, however, the division of labour is caused by inventions and specialised knowledge. The division of labour can only depend on the size of the market if there are fixed costs and consequent economies of scale in the system. Therefore, in some fundamental sense, the division of labour is incompatible with equilibrium.

⁴⁵ This is discussed in Verdera, Francisco, 'Adam Smith and the Falling Rate of Profit: A Reappraisal', in *Scottish Journal of Political Economy*, Vol. 39, No. 1, February 1992.

⁴⁶ Both Smith and Ricardo discuss the problem of capital outflows, but it in a static framework with no possibility for new inventions at home to counteract the problem.

⁴⁷ Rae, John, *Statement of Some New Principles on the Subject of Political Economy*, Boston, Hilliard, Grey & Co., 1834.

⁴⁸ Kuhn, Thomas, *The Structure of Scientific Revolutions*, 2nd Edition, Chicago, University of Chicago Press, 1970.

⁴⁹ This is discussed in Windelband, *op. cit.*, Chapter 1, and in Cassirer, Ernst. *An Essay on Man*, New Haven, Yale University Press, 1944, and Cassirer, Ernst, *Das*

Erkenntnisproblem in der Philosophie und Wissenschaft der neueren Zeit, Vol. 1, Berlin, Verlag Cassirer, Berlin, 1906.

⁵⁰ Taylor, Henry Osborn, *The Mediaeval Mind*, London, Macmillan, 1914, Vol. II, p. 521.

⁵¹ Cassirer point out that this distinction - between present reality and the possible - is 'a universal problem of paramount importance for the whole character and development of human culture. Empiricists and positivists have always maintained that the highest task of human knowledge is to give us the facts and nothing but the facts. A theory not based on facts would indeed be a castle in the air, but this is no answer to the problem of a true scientific method; it is, on the contrary, the problem itself. For what is the meaning of a "scientific fact"? Obviously no such fact is given in any haphazard observation or in a mere accumulation of sense data. The facts of science always imply a theoretical, which means a symbolic, element. Many, if not most, of those scientific facts which have changed the whole course of the history of science have been hypothetical facts before they become observable facts', Cassirer, *An Essay on Man*, op. cit., p. 58. This touches on Mirowski's and McCloskey's observations today, concerning metaphors, symbols and rhetoric in economic theory.

⁵² This is very clear in Leibniz' 1671 proposition for the establishment of an academy of science in Germany.

⁵³ This is noted by E.A. Burtt, op. cit., p. 215-220.

⁵⁴ For this term, see *The Oxford English Dictionary*, Vol. 5, p. 314.

⁵⁵ This is especially clear in Adam Smith's *Theory of Moral Sentiments* (1759), Indianapolis, Liberty Classics, 1982, pp. 236-237.

⁵⁶ Nelson, Richard, 'Recent Evolutionary Thinking About Economic Change', in *Journal of Economic Literature*, Vol. XXXIII (March 1995), p. 58.

⁵⁷ An excellent discussion of this is found in Tribe, Keith, *Governing Economy. The Reformation of German Economic Discourse 1750-1840*, Cambridge, Cambridge University Press, 1988.

⁵⁸ Windelband, op. cit., p. 432.

⁵⁹ 'I shall name but one name, that of the man whose work seems to me to have been the peak achievement of the 'historical philosophy' of that or any other age: Wilhelm Windelband.', Schumpeter, Joseph Alois, *History of Economic Analysis*, op. cit., p. 775.

⁶⁰ In his *Directiones ad rem medicam pertinentes*, 1672.

⁶¹ 'Leibniz verfolgt das Ziel einer Heilkunde im Zeichen der Aufklärung, das heißt für ihn, die Grundlage für einen **staatlich zu garantierenden Wohlstand** zu schaffen (Italics in original), Krüger, Mathias, 'Leibniz Vorstellungen zur Organisation eines öffentlichen Gesundheitswesens', in Müller, Kurt, Heinrich Schepers and Wilhelm Totok (eds.), *Studia Leibniziana Supplementa*, Vol XII, Band 1, Wiesbaden, Franz Steiner Verlag, 1973, p. 234.

⁶² Namslau, Günter, 'Rechtfertigung des Staates bei Christian Wolff', in Kraus, Herbert (ed.), *Internationale Abhandlungen*, Berlin, Dr. W. Rothschild, 1932. p. 96.

⁶³ See Windelband, Wilhelm, *A History of Philosophy*, (1893), Westport, Conn., Greenwood Press, 1979. p. 319.

⁶⁴ Although we have no indication that this is true, it is interesting to note that a historical novel by Thomas Costain also portrays Roger Bacon as having a keen interest in China. *The Black Rose*, New York, Avon, 1973.

⁶⁵ Smith, Adam, *Wealth of Nations* (1776), Chicago, University of Chicago Press, 1976. pp. 80-81.

⁶⁶ For a description of this, see Joubleau, Félix, *Études sur Colbert*, 2. Vols., Paris, Guillaumin, 1856, and Gouraud, Charles, *Histoire de la Politique Commerciale de la France et son Influence sur le Progrès de la Richesse Publique*, 2 Vols., Paris, Durand, 1854.

⁶⁷ The authors are indebted to Åke Uhlin for pointing out the relevance of abduction to this analysis.

⁶⁸ For a discussion of Kaldor's use of stylised facts, see Lawson, Tony, 'Abstraction, tendencies and stylised facts: a realist approach to economic analysis', in, Lawson, Tony, J. Gabriel Palma and John Sender (eds.), *Kaldor's Political Economy*, London, Academic Press, 1989.

⁶⁹ Pierce, Charles S., in Hartshorne, C. and Weiss, P. (eds.), *Collected Papers of Charles Sanders Pierce*, Cambridge, Mass., Harvard University Press, 1867. Vol. V, p. 146. Quoted in Lawson, *op. cit.*, p. 68.

⁷⁰ Pierce is often interpreted as belonging to a biological and instrumentalistic tradition opposed to the neo-platonic tradition. For an alternative interpretation which puts Pierce in the 'realist' and neo-Platonic tradition, see Schneider, *A History of American Philosophy*, New York, Columbia University Press, 1946, pp. 334 ff.

⁷¹ Villner, Katarina, *Blod, Kryddor och Sott*, Stockholm, Carlsson Bokförlag, 1986, pp. 110-113.

⁷² Mervin, Leonard, *Vitamin C*, Willingborough, Thorsons Publishers, 1981, pp. 14-15.

⁷³ Misselden, Edward, *The Circle of Commerce*, London, Nicholas Bourne, 1623.

⁷⁴ Saporì, Armando, 'I grandi problemi della storia economica di Venezia dal Secolo XI al XVI', in *Studi de Storia Economica*, Florence, Sansoni, 1967, Vol. III, p. 204.

⁷⁵ For an excellent discussion of this, see MacLeod, Christine, *Inventing the Industrial Revolution. The English Patent System, 1660-1800*, Cambridge, Cambridge University Press, 1988.

⁷⁶ Lane, Frederic C., *Venice. A Maritime Republic*, Baltimore, Johns Hopkins University Press, 1973. s. 320.

⁷⁷ See Berg, Maxine, *The Machinery Question and the Making of Political Economy*, Cambridge, Cambridge University Press, 1980.

⁷⁸ Petty, William, *Political Arithmetick, or a Discourse concerning the Extent and Value of Lands, People, Buildings; Husbandry, Manufacture, Commerce, Fishery, Artizans, Seamen, Soldiers; Publick Revenues, Interests, Taxes, Superlucration, Registries, Banks; Valuation of Men, Increasing of Seamen, of Militia's, Harbours, Situation, Shipping, Power at Sea &c. As the same relates to every Country in general, but more particularly to the Territories of His Majesty of Great Britain, and his neighbours of Holland, Zealand, and France*. London, Robert Clavel, 1691.

⁷⁹ Marshall, Alfred, *Principles of Economics*, 1st edition, London, Macmillan, 1890, p. 452. This insight, contradicting the concept of equilibrium, disappeared from the later 2nd. to 8th. editions.

⁸⁰ A term covering both the shift in the production function resulting from technical change and pure scale effects.

⁸¹ Defoe, Daniel, *A Plan of English Commerce*, 2nd Edition, London, Charles Rivington, 1730, pp. 126-133..

⁸² This is discussed in Reinert, Erik, 'Catching-up from Way Behind: A Third World Perspective on First World History', in, Fagerberg, Jan et. al. *The Dynamics of Technology, Trade and Growth*, Aldershot, Edward Elgar, 1994.

⁸³ See *The Oxford Dictionary of Byzantium*, New York, Oxford University Press, 1991. Vol. 1, p. 673.

⁸⁴ Cassirer, Ernst, *Platonic Renaissance in England* (1932), New York, Gordian Press, 1970, p. 201.

⁸⁵ *Ibid.*, p. 201.

⁸⁶ Schneider, Herbert W, *A History of American Philosophy*, New York, Columbia University Press, 1946, Chapter 1-3. The first section of this book is entitled 'Platonism and Empiricism in Colonial America.'

⁸⁷ Porter, Roy, and Mikulas Teich (Eds.), Cambridge, Cambridge University Press, 1992.

⁸⁸ Bailey, Philip H., in 'Introduction' to *Complete Essays of Francis Bacon*, New York, Belmont Books, 1962, p. vii.

⁸⁹ In *Complete Essays*, op. cit., pp. 78-79.

⁹⁰ '...Bacon believed that he could set out new paths for science, and in this spirit he set up his *New Organon* as over against the Aristotelian', Windelband, op. cit., p. 383.

⁹¹ *Encyclopaedia Britannica*, 14th Edition, London, 1929, Vol 2, p. 886.

⁹² Burt, Edwin Arthur, *The Metaphysical Foundations of Modern Physical Science*, Garden City, N.Y., Anchor, 1954, p. 125.

⁹³ Bacon, Francis, (Franc. Baconi), *De Verulamio Historia Regni Henrici Septimi, Anglia Regis. Opus Vere Politicum*, Lugd. Batavor, Franc. Hackium, 1647.

⁹⁴ Crowther, J.G., *Francis Bacon. The First Statesman of Science*, London, Cresset Press, 1960.

⁹⁵ Windelband, op.cit, p. 430.

⁹⁶ Malynes, Gerhard, *The Maintenance of Free Trade, According to the three essentiall (sic) Parts...Commodities, Moneys and Exchange of Moneys*, London William Sheffard, 1622, and *The Center of the Circle of Commerce, or, A Refutation of a Treatise,....,lately published by E.M.*, London, Nicholas Bourne, 1623.

⁹⁷ Misselden, Edward, *Free Trade and the Meanes (sic) to Make Trade Flourish*, London, Simon Waterson, 1622, and, *The Circle of Commerce or the Ballance (sic) of Trade*, London, Nicholas Bourne, 1623,

⁹⁸ Schumpeter discusses the controversy between the two men in his *History of Economic Analysis*, New York, Oxford University Press, 1954, pp. 344-345. See also their respective entries in 'The New Palgrave'. In all cases these references are purely to the mechanics of money and exchange.

⁹⁹ Misselden, op. cit., (1623), p. 8.

¹⁰⁰ *ibid*, p. 9.

¹⁰¹ *ibid*, p. 11.

¹⁰² Windelband, op. cit., p. 450.

¹⁰³ Hall, A. Rupert, *The Revolution in Science 1500-1750*, London, Longman, Second Edition, 1983, p. 310.

¹⁰⁴ Ingram, John Kells, *History of Political Economy*, London, Black 1919, p. 54.

¹⁰⁵ Windelband, op. cit., p. 379.

¹⁰⁶ It has been calculated that the duty on cheap wine in 'free-trade England' during the 19th Century, in order to protect the interest of the brewers, reached 55.000 %.

¹⁰⁷ Ure, Andrew, *The Philosophy of Manufactures: or, an Exposition of The Scientific, Moral, and Commercial Economy of the Factory System of Great Britain*, London, Charles Knight, 1835.

¹⁰⁸ Babbage, Charles, *On the Economy of Machinery and Manufactures*, London, Charles Knight, 1832.

¹⁰⁹ Babbage, Charles, *Reflections on the Decline of Science in England* (1830), London, William Pickering, 1989. The publishing of this book led to renewed interest and investment in science. Note the timing of these works after Ricardo's *Principles* in 1817.

¹¹⁰ In continuation of the ancient Greek roots.

¹¹¹ The close relationship between Plato and Cusanus is emphasized in Wyller, Egil A., *Enhet og Annethet*, Oslo, Dreyer, 1981, particularly pages 46-72. Wyller sees Cusanus as a great dialectician and theoretician of principles in the Platonic and Christian tradition.

¹¹² Our literal translation. The English edition carried the title 'Logic, or Rational Thoughts on the Powers of the Human Understanding', London (1713), 1790. The Danish title reads: *Fornuftige Tanker om det som Menneskene have at Giøre*

og Lade til Deres Lyksaligheds Befordring. Sandhedselskere meddelte af Christian Wolff. Første Gang trykket paa Dansk, paa Forleggerens egen Bekostning, efter det 6te Oplag som er trykket til Frankfurt og Leipzig, 1739. Kjøbenhavn, 1744. Trykket udi Hans Kongel. Majestæts af Universitæts Bogtrykkerie, af Johan Jørgen Hopffner, og findes sammesteds tilkiøbs.

¹¹³ Windelband, *op. cit.*, p. 371.

¹¹⁴ i.e. through the rational principles constituted by God.

¹¹⁵ 'Associationist Psychologycommanded the explicit or implicit allegiance of English economists and their continental allies until about 1900 and beyond', Schumpeter, *History*, *op.cit*, p.121.

¹¹⁶ Cassirer, Ernst, *The Philosophy of the Enlightenment* (1951), Princeton, Princeton University Press, 1979, s. 121.

¹¹⁷ Leibniz' letter to de Volder, March 24, 1699, quoted in Cassirer (1951), 1979, *op. cit.*

¹¹⁸ W.R.M. Lamb (editor), *Plato, with an English Translation*, The Loeb Classical Library, Vol. IV, London, Heinemann, 1924. Greek standard pagination: 85 C.

¹¹⁹ In this tradition, human conscience serves as an *inner* force which balances society. This contrasts with the English philosophical tradition, where balance is created by *external* forces; by the despot in Hobbes, and by the competitive market in Locke.

¹²⁰ Beck, L. W., *Early German Philosophy. Kant and his Predecessors*, Cambridge, Mass., Harvard University Press, 1969, p. 258.

¹²¹ Tribe, *op. cit.*, p 17.

¹²² Wolff, Danish translation, *Fornuftige Tanker om det som Menneskene have at Giøre og Lade til Deres Lyksaligheds Befordring. Sandhedselskere meddelte af Christian Wolff*. Første Gang trykket paa Dansk, paa Forleggerens egen Bekostning, efter det 6te Oplag som er trykket til Frankfurt og Leipzig, 1739. Kjøbenhavn, 1744. Trykket udi Hans Kongel. Majestæts af Universitæts Bogtrykkerie, af Johan Jørgen Hopffner, og findes sammesteds tilkiøbs. We have been working with the first Danish edition of this work, from 1744, based on the 6th edition, published in Frankfurt and Leipzig in 1739, but have checked the translations with the original German. German was more or less the official language - *Amtssprache* - in Denmark until about 1780. The Danish language was essentially a sophisticated *Plattdeutsch* dialect. In Danish new concepts which are difficult to translate to English or any language not close to German - like *Zeitgeist*, *Wissenschaft* (science, or literally 'knowledge creation'), *Erkenntnisdrang* (thirst for knowledge), *Gegenstand* - effortlessly find their direct equivalents in *Tidsånd*, *Videnskab*, *Erkjendelsestrang*, *Genstand*. In this particular case, we therefore have few qualms by not using the original. We are grateful to Hugo Reinert for valuable assistance in translating Wolff from Danish to English.

¹²³ 'Aller Anfang ist schwer', 'Übung macht der Meister', etc.

¹²⁴ Sombart, Werner, *Die drei Nationalökonomien*, München und Leipzig, Duncker & Humblot, 1930, p. 77.

¹²⁵ *Vergleichung der Europäischen mit den Asiatischen und anderen vermeintlich Barbarischen Regierungen, in drei Büchern verfasst*, Berlin etc., Rüdigers, 1762, pp. 493-549.

¹²⁶ Sombart, Werner, *Die Drei Nationalökonomien*, München und Leipzig, Duncker & Humblot, 1930.

¹²⁷ Nelson and Winter, *op. cit.*

¹²⁸ We would argue this is because the division of labour essentially is a result of fixed costs, and therefore must be accompanied by increasing returns to scale. These are the same fixed costs and consequent scale effects which cause firms to exist. It is the existence of these scale effects which causes the division of labour to be 'limited by the extent of the market'. The division of labour is

therefore not compatible with perfect competition and equilibrium. Adam Smith himself speculates as to why there is less division of labour in agriculture, where the 'natural' state of competition is found, than in manufacturing, but he fails to see the implications of this.

¹²⁹ See Rosenberg, Nathan, 'The direction of technological change: inducement mechanisms and focus devices', Chapter 6 in *Perspectives on Technology*, Cambridge, Cambridge University Press, 1976.

¹³⁰ This point is elaborated in Reinert (1994), *op.cit.*

¹³¹ Lazonick, William, 'Creating and extracting value: corporate investment behaviour and American economic performance', in Bernstein, Michael and David Adler, *Understanding American Economic Decline*, Cambridge, Cambridge University Press, 1994.

¹³² Porter, Michael, *The Competitive Advantage of Nations*, London, Macmillan, 1990, pp. 550-551.

¹³³ This is discussed in Reinert, Erik, 'Competitiveness and its Predecessors - a 500-year cross-national Perspective', in *Economic Dynamics and Structural Change*, March 1995.

¹³⁴ This brings to mind both Arthur Koestler's idea of *bisociation*, 'creating new knowledge by combining previously unconnected facts', in *The Art of Creation*, London, Macmillan, 1964, and Edward De Bono's 'lateral thinking', see e.g. *Lateral Thinking for Management. A Handbook*, Harmondsworth, Penguin, 1982.

¹³⁵ i.e. an encyclopaedia.