Innovation Systems of the Past:
Modern nation-states in a historical perspective. The role of innovations and of systemic effects in economic thought and policy.

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> ‘The same principle, **the same love of system**, the same regard to the beauty of order, ...frequently serves to recommend those institutions which tend to promote the public welfare. ...When the legislature establishes premiums and other encouragements to advance the linen or woollen manufactures, its conduct seldom proceeds from pure sympathy with the wearer of cheap or fine cloth, and much less from that with the manufacturer or merchant. The perfection of police (i.e. policy), the extension of trade and manufactures, are noble and magnificent objects. The contemplation of them pleases us, and we are interested in whatever can tend to advance them. They make part of **the great system of government**, and the wheels of the political machine seem to move with more harmony and ease by means of them. We take pleasure in beholding the perfection of so beautiful and grand a system, and we are uneasy till we remove any obstruction that can in the least disturb or encumber the regularity of its motions.’
>
> The early Adam Smith, still a ‘Mercantilist’ before his meetings with the French physiocrats, on economic institutions and on the ‘Innovation System’, in *The Theory of Moral Sentiments* (1759), in *Collected Works*, London, Cadell and Davies, 1812, Vol. 1, p. 320 (our emphasis).

‘There is no such thing as society. There are individual men and women, and there are families’. This famous quote by Margaret Thatcher is a logical

reflection of the *methodological individualism* of both the mainstream and Austrian schools of economics. We shall argue in this paper that early economic thought – starting at least as far back as in the 1200's – was dominated by what we could call *methodological holism.* The economy could only be properly understood as a complex system of synergies that created welfare, something closely resembling a National Innovation System. We shall argue that the later Renaissance discovery of individualism was superimposed upon this earlier synergetic view of society, creating a dualistic view of the economy in which both the viewpoint of society *and* of the individual had to be taken into consideration. At times this dualistic approach obviously created tensions between the two perspectives, and a need for conscious trade-offs arose in the political sphere. This economic tradition dominated in European social sciences for centuries – probably peaking in a virtual monopoly position around 1760 – and survived in the Continental (i.e. non-Anglo-Saxon) economic tradition well into the 20th Century. We have attempted to revive and redefine this Renaissance tradition – which we refer to as The Other Canon of economics – as regards globalisation and unequal development in a recent collection of essays.[1]

In this Other Canon tradition the goal of creating a functioning state was in many ways synonymous with the creation of this system of synergies. In the quote above, the early Adam Smith places himself squarely in this tradition of *methodological holism* that, by gathering all theoretical approaches over a period of several centuries under the same heading, somewhat superficially has come to be known under the name of Mercantilism. In this tradition the increasing division of labour, 'the extension of trade and manufactures', were seen as goals improving the economy *as a system*. Smith assures us that subsidies and encouragements to new manufactures were made neither in order to assist the producers nor to help the consumers – as they would be under an individualistic logic – but in order to promote the welfare of society as a whole: *the great system of government.* We shall argue that the mercantilist and cameralist tradition that was actually carried out in economic policy in Europe (as opposed to a much later post-fact rendering of mercantilism) for centuries was fundamentally about creating innovations and synergies, and that the policy tools that were created already in the late 1400's – patents and protection in order to favour manufacturing industries – must be understood in this perspective.

Two alternative theories based on two different metaphors compete for the attention of today's economists: mainstream economics based on an equilibrium metaphor from physics, and evolutionary economics based on biology, on Darwinian evolution. Renaissance understanding of society was

[1] Reinert, Erik S. (editor), *Globalization, Economic Development and Inequality: An Alternative Perspective,* in the series 'New Horizons in Institutional and Evolutionary Economics', Cheltenham, Edward Elgar, forthcoming.

based on the 13th Century concept of *il bene commune* or *the common weal.* This Renaissance understanding of the economy and society was – dating all the way back to Roman legal tradition – based on an entirely different biological metaphor; on the *human body* as the metaphor for studying society. In the tradition of English historiography this systemic thinking is referred to as *body politick*. The idea is clearly visualized in the frontispiece of Thomas Hobbes' *Leviathan* (1651), where Leviathan himself is depicted as consisting, literally, of a huge number of human beings. Understanding society as a body of *members* and *parts,* each specialized in different tasks, very clearly brings across the idea of *synergies, embeddedness* and *interdependencies* in human societies and in their economies. We would argue that this systemic dimension – which we find absent in *both* mainstream and evolutionary paradigms today – is reflected again both in The Other Canon approach and in the National Innovation System approach. When the biological metaphor of economics shifted from the *body politic* to Darwinian (or Lamarckian) evolution, something important was lost: the synergetic elements of the evolution of economies society.[2] We therefore argue that the concept of National Innovation System recaptures an important feature of a long lasting, but also long lost metaphor, in the social science.

Joseph Schumpeter's role in this perspective is – as is common with him – somewhat contradictory. Schumpeter himself strongly opposed almost all 'interventionist' policies of his day, including Roosevelt's New Deal and Keynesianism, as well as activist policies with respect to science and technology.[3] It is all the more remarkable that the late Schumpeter – in the *History of Economic Analysis* – is extremely favorable to the economic theories of past interventionists, particularly the early Italian economists, whom he frequently compares favorably with Adam Smith. The young Adam Smith, as in the quote above, writes enthusiastically about interventionist policies, institutions, and society as a great system.
The older Adam Smith abhors with equal vehemence both institutions and interventions [4].
Interestingly, Schumpeter seems to have taken the opposite route. Late in his career the older Schumpeter of the *History of Economic Analysis* – to a large extent written in the shadow of World War II at the Kress Library of Economics at Harvard Business School – seems to find back to his Continental European roots arguing, in the long-standing continental tradition of economics, against 'A. Smith' and his successors.[5] This were the roots he

[2] Reinert, Sophus, 'Darwin and the Body Politic: Schäffle, Veblen and the biological metaphor shift in economics', paper presented at the 17th Heilbronn Conference in the Social Sciences, June 2003. On www.othercanon.org
[3] We are indebted to Chris Freeman for this formulation.
[4] Says Thomas McCraw of Harvard Business School: To Adam Smith all human institutions – private and public – 'so invariable produce "absurd" results that they have no presumptive legitimacy', in McCraw, Thomas, 'The Trouble with Adam Smith', in *The American Scholar*, Vol. 61, No. 3., Summer 1992, p. 364.
[5] We have previously analysed Schumpeter's theoretical 'schizophrenia' in Reinert, Erik S. 'Schumpeter in the Context of two Canons of Economic Thought', in *Industry and Innovation,* Vol. 6, No. 1, 2002.

to some extent had left behind more than ten years earlier by excluding the holistic and 'Germanic' chapter 7 from all the translations of the *Theorie der wirtschaftlichen Entwicklung.*

The old Schumpeter is generally also very favorable to the 18th Century German Cameralists, and in one case, to which we shall return, defends the interventionist and pro-development cameralist theories and policies as 'laissez-faire with the nonsense left out'. So while Schumpeter entirely neglected 'under-development' – very much a post-1945 issue anyway – we argue that he seems to have thoroughly understood and favored the dynamic and pro-development policies of the past. Schumpeter's defense of the 'multi-level conspiracies of development' of the past is all the more remarkable because standard histories of economic thought rarely see any merit in the work of these economists.

Two purposes of this paper are intertwined: By attempting to re-establish the pre-Smithian logic that laid the foundations for economic growth in Europe – a logic that was much supported by Schumpeter – we attempt to point out the preconditions for jump-starting National Innovation Systems (NIS). At the same time we wish to highlight the *activity-specific* and *context-specific* nature of historically successful National Innovation Systems, point to the synergies between economic activities, the role – not of innovations *per se* which in our view is not enough – but of innovations under conditions of dynamic imperfect competition and certain types of rents, and of certain policies that seem to have been *mandatory passage points* for all nations that have escaped poverty.

The aim is that such a historical perspective on innovations and economic development will facilitate the spread of the National Innovation Systems approach successfully to the Third World. The analysis of key success factors of the past should open up for a debate as to which of these policies are still open today, and/or what today's equivalent of the historical policies could be. In our view – a point to which we shall return in the conclusion – is that there is a risk of implementing the National Innovation Systems approach as a thin icing on a solid neoclassical cake. Our contention is that 'Schumpeterian economic geography' and 'Schumpeterian development economics' ought to embrace a wider theoretical and historical agenda than the normal neo-Schumpeterian one, an agenda that includes the visions and policies of the past that Schumpeter himself judged so favorably in his History of Economic Policy. We have tried to define this broader view of 'Schumpeterian economics' – The Other Canon[6] – as it relates to mainstream economics in Appendix II.

[6] Reinert, Erik S., 'The Other Canon: The History of Renaissance Economics. Its Role as an Immaterial and Production-based Canon in the History of Economic Thought and in the History of Economic Policy' (with Arno Daastøl).

We should also point out that Thorstein Veblen's model of economic growth is representative of an Other Canon understanding of development, in that it both includes innovation *and* its synergetic elements. To Veblen Man's *idle curiosity* – an essentially non-economic instinct, research in its original form – was the basis for economic progress. This roughly corresponds to, or leads to, what Schumpeter later would call *invention*. This intellectual invention would have to meet *workmanship* and *capital* in order to be converted to an economic innovation. This process required an integration in and a sense of one's obligations towards 'the body of society' and history, what Veblen refers to as the *parental bed*. This trinity – idle curiosity, the parental bend and workmanship – forms the core of Veblen's theory of economic development. Compared to today's mainstream Veblen, Schumpeter and the Continental European economic tradition where they had their roots can be contrasted with today's mainstream using Schumpeter's description of the economics of John Rae - a 19th Century US economist: 'The essential thing is the conception of the economic process, which soars above the pedestrian view that it is the accumulation of capital *per se* that propels the capitalist engine'[7].

This paper consists of two separate sections, and is part of a larger work in progress. The first sections attempts to recreate the logic and policies of past innovation systems in Europe. The second part, which is more in an outline form, attempts to present the forces that presently work against a successful implementation of national innovation systems in the Third World.

Section I: The Renaissance and the Birth of Innovation Systems.

1. The liberation of time and space and the discovery of the economy as a positive-sum game.

> *…today's 'optimum' may be very local and likely poor stuff compared to what might have been.* [8]
>
> Richard Nelson.
>
> *The compass opened, if I may so express myself, the universe.*

Forthcoming in Reinert, Erik (Editor), *Globalization, Economic Development and Inequality: An Alternative Perspective*, Cheltenham, Edward Elgar, 2003.

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

[8] Nelson, Richard, 'Recent Evolutionary Thinking about Economic Change, in *Journal of Economic Literature,* Vol. XXXIII (March 1995), p. 58.

Montesquieu

Something fundamental happened to the word 'innovation' during the Renaissance. The meaning of the word changed, from signifying something heretical and unwanted, indeed dangerous, to representing an idea of something highly desirable. In 1277, Roger Bacon, the *Doctor Admirabilis* of Oxford University, was arrested on grounds of his 'suspicious innovations': *Propter aliquas novitates suspectas*. [9] Just over 300 years later, in the early years of the 1600's, Francis Bacon – educated at Trinity College in Cambridge – published *An Essay on Innovations*, and their receptions could hardly have been more different. In order for man to understand the potential of innovations for improving his lot, the second Bacon, Francis, wrote what he called 'feigned history', a history of the future, where such great innovations as self-propelled vehicles, submarines, microphones and new drugs would have created enormous progress and improved Man's life.[10] 'Innovation' thus went from being a threat to the established world order, God's very plan, in a society fearing commerce because 'one man's gain is the other man's loss', to become the very engine of a *desired* social and economic growth, not only for the intellectual architects of industrialization, but indeed across the entire spectrum of the European population. It was, as we shall see, not really the word itself that changed meaning, but rather Europe's relationship to *change* that shifted around it. The discovery is very similar to what the little quote from Richard Nelson above conveys: Europe slowly came to understand that their present status quo was indeed suboptimal.

In order to understand the reasons behind the growth of the West as compared to 'the Rest', we would argue that it is necessary to understand the mental *gestalt*-switch behind the radical change in the meaning of the term ***innovation*** between the late 1200's and the late 1500's, between Roger Bacon and Francis Bacon. Historian of science Alexandre Koyré claims that Renaissance 'transformed man from a spectator into an owner and master of nature'[11]. In order to understand why the National Innovation System approaches may or may not be successful in the present Third World, it is useful to explore this shift and the mentality and context that made the early innovation economies in Europe possible in the first place, i.e. the material and mental institutions present at its genesis. Schumpeter quite aptly argued 'scientific analysis is not simply a logically consistent process that starts with

[9] Compare 'To traduce him as an author of suspitious (sic) innovations' (1597), *Oxford English Dictionary*, Vol. V, p. 314.

[10] One of the authors has previously discussed this gestalt-switch in Reinert, Erik S. and Arno Daastøl, 'Exploring the Genesis of Economic Innovations: The religious gestalt-switch and the **duty to invent** as preconditions for economic growth', in *European Journal of Law and Economics*, Vol. 4, No. 2/3, 1997, and in *Christian Wolff. Gesammelte Werke, Materialien und Dokumente,* Hildesheim, Georg Olms Verlag, 1998, pp. 233-283.

[11] Koyré, Alexandre, *From the closed world to the infinite universe,* Baltimore, Johns Hopkins University Press, 1957, p. vii.

some primitive notions and then adds to the stock in a straight-line fashion', and to avoid whigish teleology, "we must always leave open the possibility that, in the future, topics may be added to or dropped from any complete list that might be drawn up as of today'. [12]

Perhaps these early system builders hold pertinent answers to questions mainstream dogma long has ceased to ask, but that again have become relevant in another context. Probably those who saw the phenomenon being born – those in the 1500's and 1600's who tried to understand the fabulous economic success of Venice and The Dutch Republic and the de-industrialisation and failure of Spain – could see and describe the phenomenon better than people who much later take the new system for granted.

Behind the switch in the meaning of innovation lies a complex and interwoven set of causalities, where the disturbances of status quo went from being seen as a threat to society to – frequently and for many – being its goal. From being locked in a static sphere pending the Apocalypse, man emerged to master an infinity in flux. This change appears in early scientists understanding of society, but it is also reflected in religion, the arts, and – most importantly for our purpose – in the attitude towards innovations and technical change. Adopting Claude Lévi-Strauss' structuralist approach for the occasion, one can see how his theory of the decoding of ideas into different media is applicable to the epistemic shift we are observing.[13] The change in worldview, this reordering of the very framework that established the boundaries of conceivable agency, was a polyvalent phenomenon that both found expression in – and resulted from – a variety of languages of representation; it was deciphered in new conceptions of time, of space, and of religion, as well as rendered materially in the form of maps, books, art, and technology that permeated all aspects of society.

Precondition: Society as systems of synergies.

Systemic relationships between parts of society had been present in explicit form for centuries, if not millennia. This connection between the human body and society occurred with a certain frequency in the Ancient Greek world, but was only systematized in Roman times. The formalisation of this thinking is found in the codification of Roman Law ordered by Emperor Justinian in the 6th Century. This *Corpus iuris civilis* (Body of Civil Law) came to influence, to lesser or greater extents, all Western legal systems (especially the so-called "civil law" systems of Europe, as in Germany) and the Western tradition of political thought. The *Digest* is a compilation, organized by the *quaestor*

[12] Schumpeter, Joseph, *History of Economic Analysis*, New York, Oxford University Press, 1954, pp. 4 & 10.
[13] The structuralist methodological apparatus of decoding such overarching phenomena in disparate media is discussed in Lévi-Strauss, Claude, *Myth and Meaning.* p. 14, *passim.*

Tribonian and a team of sixteen jurists, of the legal opinions of the classical jurists of Rome culled from more than 2000 volumes of legal commentary, and it includes a much quoted discussion on the relationships between different bodies:

> There are three kinds of *corpora.* The first is held together by a single spirit and is called *unitum*, such as a man, a tree, or a stone. The second consists of things joined together, that is, of many things cohering among themselves, which is called *connexum*, like a building, a ship, or a box. And the third consists of separated things, such as many whole bodies, but which are covered by one name, like a people, a legion, or a flock.[14]

During the Middle Ages the idea of the state came to rely on the connection in Justinian's *Digest* between the individual and collective bodies. However, it was only with John of Salisbury's [ca. 1120-1180] *Policraticus* in the twelfth century that a full-scale anatomy of the anthropomorphic state was attempted.[15] The head, heart, eyes, ears, tongue, and intestines of man all gain their equivalents in Salisbury's 'body of the commonwealth'.[16] From the time of the *Policraticus,* the concept of the body politic became thoroughly embedded in European thought from the Middle Ages through the Enlightenment.[17] As already mentioned in the introduction, its most celebrated manifestation is probably found in Hobbes' *Leviathan:* from its impressive frontispiece showing the incarnation of the state literally formed from its citizens to its intricate taxonomy of man's ills and their respective counterparts in the commonwealth. As is evident from the use of physics metaphors in economics, all metaphors can easily be extended to the ridiculous and counterproductive. So also the body metaphor.

Reigning political theory at the birth of the Renaissance, in the 13th Century, considered, then, society to be an organic unity mirroring the obvious synergies between disparate, yet interdependent parts of the human body. Michel Foucault argues man sought to explain the unknown through analogy with more familiar concepts, the body being the perfect "reservoir for models of visibility," as it was the only thing that was readily 'known, experienced, and

[14] Justinian, *Digest*, 41.3.30
[15] Barkan, Leonard. *Nature's Work of Art: The Human Body as Image of the World*. New Haven: Yale University Press, 1975 p. 72
[16] John of Salisbury. *The Statesman's Book of John of Salisbury; Being the Fourth, Fifth, and Sixth Books, and Selections from the Seventh and Eighth Books, of the Policraticus, Political Science Classics*. New York: A. A. Knopf, 1927 p. 65
[17] Kantorowicz, Ernst Hartwig. *The King's Two Bodies; a Study in Mediaeval Political Theology*. Princeton: Princeton University Press, 1957.

controlled.'[18] A quote from Christine de Pizan (c.1364-c.1430), renders the idea of the strong interrelationships in society and serves as a kind of antithesis to Margaret Thatcher:

> 'For just as the human body is not whole, but defective and deformed when it lacks any of its members, so the body politic cannot be perfect, whole, nor healthy if all the estates of which we speak are not well joined and united together. Thus, they can help and aid each other, each exercising the office which it has to, which diverse offices ought to serve only for the conservation of the whole community, just as the members of the human body aid to guide and nourish the whole body. And in so far as one of them fails, the whole feels it and is deprived by it'. [19]

The idea of the 'common good', the *ben commune,* sprang partly from this organic social harmony – seeing the body as the metaphor for society – and partly from scholasticism.[20] This idea of a synergetic *common good* forms the axis around which Italian political economy was written from the Florentine chancellor Brunetto Latini (ca. 1210-1294)[21] to the important Italian economists of the Enlightenment Project, Antonio Genovesi (1712-1769) and Ferdinando Galiani (1728-1787) of the Neapolitan School of economics, and Cesare Beccaria (1738-1794) and Pietro Verri (1728-1797) of the Milanese School. This is the tradition growing out of the *civic humanism* of the Renaissance. This tradition finds its equivalents all over the European Continent. Particularly the connections between Italian and German economic thought at the time seem surprisingly strong and evidenced in the translations of economics works. Based on a study of translations of economic texts before 1850 it can be argued that a distinct 'Continental' economic tradition exists in Europe, different and separate from the Anglo-Saxon tradition.[22]

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[18] Foucault, Michel. *The Order of Things.* London: Routledge, 2002 p. 147, *passim;* Porter, Roy. *History of the Body Reconsidered* in Peter Burke (ed.) *New Perspectives on Historical Writing.* University Park: University of Pennsylvania Press, 2001 p. 235.

[19] De Pizan, Christine, *The Book of the Body Politic*, Cambridge, Cambridge University Press, 1994, p. 90.

[20] Schumpeter refers to 'the old scholastic Public Good'. In *History of Economic Analysis*, New York, Oxford University Press, 1954, p. 177.

[21] The concept of *buon/ben commune* is found in Latini, Brunetto, *The Book of the Treasure = Li livres dou tresor*. New York: Garland Publishing, 1993.

[22] Kenneth Carpenter, retired Curator of the Kress Library at Harvard Business School – where Schumpeter wrote his *History of Economic Analysis* – possesses a huge archive recording thousands of translations of economic texts to and from European languages before 1850. Carpenter supports the hypothesis of two separate economics traditions, one continental (with frequent translations) and one English, with relatively infrequent translations between the two. A copy of this archive has been given by Mr. Carpenter to the authors, in twenty binders, for further compilation in a future project. Carpenter has addressed these issues in Carpenter, Kenneth, *Dialogue in Political Economy. Translations from and into German in the 18th Century*, Kress Library Publications No. 23, Boston, Harvard Business School, 1977 & *The Economic Bestsellers before1850*, Bulletin No. 11, May 1975, of the Kress Library of Business and Economics, Boston, Harvard Business School, 1975. See also Lluch, Ernest, 'Cameralism beyond the Germanic World: A Note of Tribe', in *History of Economic Ideas*, Vol. V, 1997/2.

We also find the *common good* ideology prominently featured in the public works of art of the period. It is extremely well articulated visually in Ambrogio Lorenzetti's (ca. 1290-1348) celebrated *Allegory of Good and Bad Government* in the *Palazzo Pubblico* in Siena. Here the social and economic synergies resulting from good public policy are clearly evident.[23] The same propagation of civic well-being – the goal of the *civic humanism* – was the essence of the 'reason of state' doctrine of Giovanni Botero (1590), to which we shall return later.

These 'synergetic' civic virtues are also found a century later in the writings of San Bernardino of Siena (1380-1444), probably our most important economist-Saint. Casting his image of the perfect statesman in the iconography of Lorenzetti's fresco, San Bernardino extolled the virtues of humility, justice, and mercy, as well as the will, the ability, and the knowledge to ensure the propagation of Brunetto Latini's *ben comune*—the common good. San Bernardino was also instrumental in recasting economic activities as socially productive, both through his praise of guilds as conducive to the *ben commune* and in popularizing the civic humanist concept of *magnificentia*. Magnificence was the virtue, uniquely accessible to the powerful or wealthy, inherent in the making of great things (*magna facere*).

It is upon this precondition of the pre-existence of a systemic *common good* in society that the creative revolution of the Renaissance allows the individual to rise into prominence. The making of great things by the individual – his or her entrepreneurship and *magna facere* – must be seen *in the context of the common good*. Contrasting with traditional Anglo-Saxon economics, the theories of the Italian economists mentioned above – Genovesi, Galiani, Beccaria, and Verri – have as a common element with later German economics that both the interest of society ***and*** of the individual must be continuously taken into account, and occasionally traded off against one-another. These pre-Smithian economists had understood the virtues of self-interest before Adam Smith, but they did not take for granted that individual greed would necessarily contribute to the common good. Says Pietro Verri: 'Because the private interest of each individual, ***when it coincides with the public interests***, is always the safest guarantor of public happiness'[24]

[23] Lorenzetti, Ambrogio, Mural *Allegory of Good and Bad Government*, Sienna: Palazzo Pubblico, 1338-1340. Discussed in Skinner, Quentin, "Ambrogio Lorenzetti: The Artist as Political Philosopher." *Proceedings of the British Academy* (1988). pp. 1-56. For a discussion of Lorenzetti's relation to the concept of the *buon commune* see Henderson, John, *Piety and Charity in Late Medieval Florence*. Oxford: Clarendon Press, 1994. pp. 16-20. For a discussion of Lorenzetti as he relates to modern public administration see Drechsler, Wolfgang, *Good and Bad Government: Ambrogio Lorenzetti's Frescoes in the Siena Town Hall as Mission Statement for Public Administration Today*. Budapest: Open Society Institute, 2001.

[24] Verri, Pietro (1771), *Mediazioni sulla Economia Politica*, Genova, Gravier, 1771, p. 42 (our emphasis).

Infinite cosmology: The possibility of progress and the end of zero-sum society.

When George Soros recently claimed that 'Globalization is not a zero sum game' he unwittingly touched upon the very problem that faced economic thinkers at the end of the Renaissance, as they indeed feared it was. The modern conception of history and economics reflected in Soros' statement is entirely dependent on our cosmological conception of 'time' as a vector of *progress*, as a linear force that potentially brings never-ending change in a space of infinite resources. Starting in the Renaissance production-centred economics – in what we refer to as The Other Canon – economic thought has been intimately intertwined with this idea of a historical progress with infinite possibilities; it indeed forms the very framework of economic thinking from the earliest stage theories to the contemporary neo-Schumpeterian approach. This conception of time is, however, a relatively recent development in what Veblen calls 'the life-history of our species'. 'Time' was for the longest time thought of in very different terms. The idea of economic *progress* is thus quite intertwined with the modern idea of time as an indicator of change, as well as the idea of spatial infinity following from the heresies of the 1500's: of the ideas of Copernicus, Bruno, and Galileo.

The world was, for the longest time, a finite place, a locked system in cosmic equilibrium. This zero-sum model of the universe was an Aristotelian invention[25], channelled by St. Jerome (ca. 340-420) and Thomas Aquinas (ca. 1225-1274). The early 'Balance of Trade' was strongly related to the theory 'one man's gain must be another man's loss'.[26] The same idea appeared again in Switzerland as an essential part of Paracelsus' work (ca. 1493-1541). Being a cosmologist rather than a scientist, Paracelsus' hermetic tradition had an enormous influence on the reigning episteme, and the influence of his work indeed is echoing across Europe into the seventeenth century and beyond.[27] In France Michel de Montaigne (1533-1592) argued in his 1580 *Essais* that 'no profit can be made except at another's expense, and so by this rule we should condemn any sort of gain.'[28] Similarly, England saw Sir Thomas Browne's (1605-1682) 1643 *Religio medici* hold that 'all cannot be happy at once for, because the glory of one state depends upon the ruins of another, there is a revolution and vicissitude of their greatness.'[29] The zero-sum view of the economy was, as we have seen, a pan-European phenomenon.

[25] Aristotle, *Politics* vii, ix, 3, 1328b
[26] St. Jerome cited in Finkelstein, Andrea, *Harmony and the balance : an intellectual history of seventeenth-century English economic thought*, Ann Arbor, University of Michigan Press, 2000, p 89.
[27] [Paracelsus] Hohenheim, Aureolus Theophrastus Bombastus von. "Man in the Cosmos." In *Selected Writings of Paracelsus*, edited by Jolande Jacobi. Princeton: Princeton University Press, 1951. pp. 38-44.
[28] Montaigne, Michel de., *Essays*. London: Penguin Books, 1958. p. 48.
[29] Browne, Thomas, *Religio Medici*. Andrew Crooke, 1643. Book I, p. xvii.

This is, of course, not to say that there were not earlier exponents of various aspects of this change. Indeed, positive-sum undercurrents are identifiable across the European mindscape throughout the Middle Ages, and the importance of time for economic gain was present in explicit form already in the tenth century *Colloquy* of Ælfric of Eynsham.[30] It was rather the cumulative culmination of a number of these correlated factors – the new cosmology, the change in religious outlook, the understanding of an extension of the synergetic common good – that constituted the epistemic shift which made *innovation* into something desirable rather than something heretic and threatening to God's plans.

Infinite cosmology: Religious causes and effects.

In a previous paper, we have treated in detail the religious aspects of the Renaissance as they relate to the birth of innovations. [31] We shall summarize the most important features here.

The emerging neo-Platonic world saw all creation in the spirit of God, it was pan-theistic. The philosophers of this creed pointed out the need to explore and to better understand Nature as a necessary way to know God. They conveyed an image of God as active, rational and creative. Since Man was created in the image of God, the human being also had the potential for these same qualities, both as individuals and collectively as a 'social body'. This *permission* to seek new knowledge – to learn, explore, invent and educate – soon developed into a *duty* to do the same. Creation was not ended on the 7th day, it was God's will that man should be creative in order to improve on the creation, and thereby improve both his own condition and that of his fellow human beings, all the members of the social body of society. It was our duty to populate the Earth, so the Lord had built in an incentive system for procreation. Likewise, would the Continental philosophers in the tradition of Leibniz (1646-1716) and Christian Wolff (1679-1754) argue, the fact that it was so satisfactory to discover new things and understand the world better was a proof of our duty to do so. It became Man's *pleasurable duty* to explore, discover, invent and innovate.

Not to say that this transition was frictionless and painless. A forerunner of these thoughts, Nicolas of Cusa (1401-1464), the German-born Bishop of Brixen (Bressanone) in Italy, suffered persecutions. Giordano Bruno, one of his spiritual followers, was burned at the stake in Rome in the year 1600. Bruno laid the foundations for the works of Kepler, but also for the tradition of Galileo and Newton. The religious persecutions of new knowledge are well known.

[30] Wood, Diana, *Medieval economic thought*, Cambridge: Cambridge University Press, 2002, p. 117.
[31] Reinert & Daastøl, 1997, *op. cit.*

The influences from the Byzantine Empire – the only millennium empire the world has ever seen – were very strong in these processes. This applies both to the diffusion of Plato's texts and in the religious redefinition of Man's duties on Earth, no longer as a caretaker in the garden of creation, but as a junior partner in the process itself. The fall of Constantinople to the Turks precipitated an influx of philosophers and texts from the East into Italy, and the presence of these philosophers added much prestige to the Italian city-state courts. The most influential of these Byzantine philosophers was George Gemistos Plethon [32] (ca. 1360-1450) . It was Plethon's enthusiasm for Platonism that influenced Cosimo de Medici to found a Platonic Academy at Florence, one of the earliest of the academies that were to be so important for the later growth of knowledge in Europe. In 1441 Plethon had returned to the Peloponnesus, and there he died and was buried in 1450.

Just as the young Republic of Venice snatched the body of San Mark from Alexandria to bury him in Venice, in that way adding to the power and prestige of the city, the Malatesta family of Rimini had Plethon's body removed from his resting place in the Peloponnesus to the Tempio Malatestiano in Rimini in 1465. There he can still be visited under the inscription of 'Themistius Byzantinus'. From the point of view of innovation systems it is interesting to note that Plethon emphasized the need to stimulate and protect Byzantine industry and economy faced with growing Italian competition. [33]

Rights become duties: The birth of the 'developmental state'.

As the pillaging of Rome (1527) and the counterreformation extinguished the developmental furore in Italy, the ideas had already moved North. As in Italy so in Germany learned societies sprang up, such as the 'Donaugesellschaft' (Danubiana) in Austria and the 'Rheinische Gesellschaft' (Rhenana) in Germany around 1500. It is important to keep in mind that the 1400's and 1500's was a very cosmopolitan age in Europe, with more foreign students at the universities, percentagewise, than today. The cosmopolitan nature of the Catholic Church hierarchy also added to mobility and to the transportation of ideas. Giovanni Botero (1544-1617), the early social scientist to whom we shall return, was born in Piedmont in Italy, but had his two first books published in Krakow in Poland and Würzburg in Germany. These were also the times of early nationalism.

In Germany the duty-based system that we have described above – the permission to invent that was converted into a duty to invent – took on a

[32] His enthusiasm for Plato made him change his name to Plethon.
[33] See *The Oxford Dictionary of the Byzantium,* New York, Oxford University Press, 1991. Vol. I, p. 637.

particular political flavour. The rulers' *divine right to rule* became their *divine duty to develop* the state they ruled. In Germany this becomes very clear with Veit Ludwig von Seckendorff (1626-1692) and his *Teutsche Fürstenstaat*, first published in 1656. Seckendorff adds a strong dose of duty to the right of the ruler: 'Right becomes Duty, the lord of the land becomes the first servant of the state'[34]. The context of Seckendorff's writings is significant. He was of the generation born during the Thirty-years War (1618-48), a war that devastated large parts of Germany. In some areas up to 70 per cent of the civilian population perished, and there was a feeling that a huge effort was needed, among other things stopping religious wars, in order to save civilisation itself. Philip von Hornick (1638-1712), to whom we shall return under the discussion of agriculture, wrote his best selling book on Austrian economic policy during the years when the Turks were boycotting Vienna. This book remained in print continuously for 100 years from 1684 to 1784, passing through 17 editions. The external and internal pressures helped forge the new thinking, inspired from the South, in Northern Europe.

Being a 'philosopher-King' became the prestigious goal of Northern European royalty[35] The connection to the prestige attached to the Byzantine philosophers at the Italian courts a century or two earlier is easy to see. Knowledge provided the King with prestige, and making the subordinates wealthy and knowledgeable added to this prestige. To this was added an admiration of the Chinese, their discoveries and their high population density (see last footnote above). Being able to feed a large population was an obvious sign of both economic success and good rule. Thus Mankind's energies could be channelled from warfare into something more constructive, building the nation.[36] However, the competitive elements remained between the states, but no longer just in warfare This diversity of states competing on different levels has been used as an argument explaining why Europe overtook China, which was ahead in terms of inventions and government not too long before.

This was the starting point of what Albert Hirschman has called 'a multi-level conspiracy for development'. Wilhelm Roscher, the German economist of the Historical School, was to call this type of government 'enlightened despotism'[37]. It is interesting to observe how the economists at the time encouraged, flattered and cajoled their rulers into adopting the right kind of economic policy. Many of them were at the same time researchers in the

[34] Lüdtke, Wilhelm, 'Veit Ludwig von Seckendorff, ein deutscher Staatsmann und Volkserzieher des 17. Jahrhunderts', in *Jahrbücher der Akademie gemeinnütziger Wissenschaften zu Erfurt,* Vol. 54, 1939, p. 67.

[35] Wolff, Christian, *The Real Happiness of a People under A Philosophical King Demonstrated; Not only form the Nature of Things, but form the undoubted Experience of the Chinese under their first Founder Fohi, and his Illustrious Successors, Hoam Ti, and Xin Num,* London, Printed for M. Cooper, at the Globe, 1750.

[36] This is the core of Albert Hirschman's eminent book *The Passions and the Interests.*

[37] Roscher, Wilhelm, ‚Der sächsische Nationalökonom Johann Heinrich Gottlob von Justi', in *Archiv für die Sächsische Geschichte,* 1868, pp. 76-106.

most diverse subjects, teachers, government advisors, business entrepreneurs on behalf of the state and the rulers, and a one-man research council. [38]

From explorations, terrestrial and celestial, to innovations.

From the advent of clocks that gave time its metric measurability and inevitability, through the astronomers who shattered Man's mental prison, to the sailors who domesticated the oceans and seaways: the period around the turn of the sixteenth century is remarkable in the synergy we can observe between *innovations* and *explorations*, between men of theory and men of practice, in reshaping the European worldview. Men of theory and practice joined forces to weave a new European cosmology. The late Renaissance historian William J. Bouwsma explored what he named the 'liberation' of a number of key concepts around the turn of the sixteenth century[39]. As the static medieval worldview digested the process of new scientific breakthroughs, of geographical and scientific exploration, it was forced to broaden its horizons and accept, perhaps more than adopt, a more dynamic mentality. We would argue, on the basis of our previous qualifications, that the emancipation of two of Bouwsma's axioms – time and space – fertilized the European worldview making innovations acceptable and liberating growth and economic progress in theory as well as practice.

Something was slowly changed around the turning of the sixteenth century. Giovanni Botero and Antonio Serra – the economists of this account – testify to the gradual nature of the epistemic shift. Worldviews do not change overnight, but rather cumulatively evolve on a level of time at once dependent on and detached from that of the "event."[40] Giovanni Botero (1544-1617) and his writings on world geography and explorations, perhaps the earliest world geography book[41], 'the reason of state' and 'the greatness of cities' was more than a symptom of altering times, but he was alone not enough to trigger drastic change.

Botero[42] warns, in a chapter on how to acquire the wealth of others, that "to attract to oneself and acquire just possession of what belongs to another requires no less skill and judgment than to propagate what is one's own."[43] One could, in Botero's model of the economy, produce and propagate wealth,

[38] See e.g. Reinert, Erik S., 'Johann Heinrich Gottlob von Justi (1717-1771) – The Life and Times of an Economist Adventurer.', on www.othercanon.org
[39] Bouwsma, William James, *The waning of the Renaissance, 1550-1640*, New Haven: Yale University Press, 2000.
[40] Braudel, Fernand, *On History*. pp. 26-52; Kuhn, Thomas S., *The Structure of Scientific Revolutions.* p. 151.
[41] Botero, Giovanni, *Le relationi vniversali di Giovanni Botero Benese, divise in quattro parti... Nouuamente aggiuntaui la descrittione del mare*, Venice: Appresso Giorgio Angelieri, 1599.
[42] Botero, Giovanni, *Della ragion di stato libri dieci: con tre libri delle cause della grandezza, e magnificenza delle città*. Venice: Appresso i Gioliti, 1589
[43] Botero, Giovanni, *Ragion di stato.* p. 157.

and the Prometheus of economic growth was thus unbound from his scholastic shackles. By removing the limits of growth, as well as some of its more restrictive moral barriers, Botero effectively expanded the limits of human endeavour, fusing a Heraclitean cosmology with economics.[44] The economy went from static to dynamic, from zero-sum game to a dynamic positive sum game. The difference between the static and dynamic conceptions of reality can be traced back to Ancient Greece: *Scholastic and modern mainstream economists* follow Zeno's belief in a reality at once static and dynamic, whereas *mercantilists and modern evolutionists* adhere to the qualitatively changing world of Heraclitus. Karl Popper points out the semantic paradox resulting from this dichotomy:

> For the kind of society which the sociologists call 'static' is precisely analogous to those physical systems which the physicists would call 'dynamic' (although stationary)[45]

Newtonian physics would consider the solar system 'dynamic', insofar as it contains motion and change, whereas social scientists would call it 'static', since it, apart from rare celestial phenomena that also can be explained within the framework of the model, never undergoes structural change. There is no 'novelty', no 'innovation'.

Botero's insight was to translate into economic terms Giordano Bruno's (1548-1600) 1584 *De l'infinito universo e mondi*, a text considered heretical by ecclesiastical authorities that contributed considerably to the eventual calling of an *auto-da-fé* against him. Bruno reinterpreted the ideas of Lucretius' (B.C. ca. 99-55) *De rerum natura* in the terms of Nicolas of Cusa (1401-1464) and Copernicus (1473-1543).[46]

A Brunian expanding cosmos was the infinite, qualitatively dynamic precondition for the mercantilist reinterpretation of the economic sphere. Economic activities were suddenly empowered with the ability to propagate wealth on an aggregate level. Whereas Aristotle and the Scholastics resisted economic endeavours on the grounds that they inevitably exacerbated social inequality, the mercantilists realized the economy could be directed towards increasing the material welfare of the entire population. With reference to our hermeneutical approach, one can see that the textual theories of expanding trade in Mercantilist literature cannot be properly understood without reference to their cosmological context.

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[44] Sombart, Werner, *Die drei Nationalökonomien;* Popper, Karl Raimund, *The Poverty of Historicism*. London: Routledge and K. Paul, 1957. pp. 112-113.
[45] Popper, Karl Raimund. *The Poverty of Historicism*. 1957. pp.112-113.
[46] Koyré, Alexandre, *From the Closed World to the Infinite Universe*. Baltimore: Johns Hopkins Press, 1957. pp. 18, 25, *passim.*

The scholastic *status quo* had implications far beyond the mere allocation of wealth, however; the pursuit of knowledge was shackled by the belief in a static society. By charting the use of Icarus iconography in Europe in the sixteenth and seventeenth centuries, Carlo Ginzburg mapped, as a measure of the scientific revolution, the evolution of the Icarus iconography from an embodiment of hubris to a Promethean figure daring everything in his exploration of human possibilities as a measure of the scientific revolution.[47] Early modern economic discourse was also affected by this change; Gerhard Malynes and Edward Misselden, two early English economists who debated furiously in 1622-23[48], are separated by a *Zeitgeist* in transition. Malynes' Icarus is clearly still bound by the chains of Medievalism when he criticized Misselden for having

> undertaken (with the Artificiall wings of his supporters set on with wax) to fly so high in the discourse thereof, that this hot climate hath dissolved the wax and the splendant Beames of the Sunne of truth hath dispelled all foggy misteries of deceitfull fallacies, as aforesaid; so that he is drowned (with his Ballance) in the Sea of Exchanges.[49]

Not until the fights of late 19th century German economist was the profession to engage in such vitriolic debates as Misselden and Malynes. However, the gentlemen in question set a record by swearing at each other in 8 or 9 different languages. Misselden in the end won the debates over English economic policy, and the subsequent Enlightenment banished the last stigma attached to the pursuit of knowledge. The imagery of the debates, however, attests to the transitional nature of their debates. Cosmologically, the Italian economic historian – and many times Prime Minister – Amintore Fanfani, encapsulated, without explaining, the shift we have explored: "while scholasticism thinks of an order in equilibrium, Mercantilism thinks of an order in growth."[50] We would claim, then, that mercantilism and evolutionary economics fall in the same dynamic category, whereas scholasticism and neo-classical economics fall into a different static category.[51] The Medieval scholastics saw the universe as fundamentally static, while the mercantilists envisioned the cosmos as expanding, permanently in flux.

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[47] Ginzburg, Carlo, "The High and the Low: The Theme of Forbidden Knowledge in the Sixteenth and Seventeenth Centuries." In his *Clues, Myths, and the Historical Method*. Baltimore: Johns Hopkins University Press, 1989. pp. 60-76.

[48] For a rendering of the debate, see Reinert & Daastøl 2004.

[49] Malynes, Gerard, *The Center of the Circle of Commerce*. London: Printed by W. Iones, 1623. p. 137.

[50] Fanfani, Amintore, *Storia delle dottrine economiche dall'antichità al XIX secolo*. Milan: Casa Editrice Giuseppe Principato, 1955. p. 149. In Italian: "mentre lo scolasticismo pensa ad un ordine in equilibrio, il mercantilismo pensa ad un ordine in accrescimento."

[51] This is discussed in Reinert, Erik S. 'Full Circle: Economics from Scholasticism through Innovation and back into Mathematical Scholasticism. Reflections around a 1769 price essay: 'Why is it that Economics so Far has Gained so Few Advantages from Physics and Mathematics?'', in *Journal of Economic Studies,* Vol. 27, No. 4/5, 2000. Available on www.othercanon.org

An essay like this needs a more accurate reference to the Greek seeds of these ideas. The rhetoric of the Italian tradition of political economy, and of Antonio Serra in particular, mirrors that of Xenophon's (B.C. ca. 430-355) *Poroi* to a large extent. Writing the *Poroi—On the Ways and Means of Improving the Revenues of the State of Athens*—around the year 352 B.C., Xenophon sought both to explain and to remedy the ongoing balance of payments crisis that Athens had suffered as a consequence of the so-called "Social War" against its former allies.[52] Xenophon refers to what we could call 'systemic increasing returns' when, in the *Poroi*, he suggests that certain problems in a city can be solved by making the city larger. The humanist Giovanni Aurispa brought all of Xenophon's works from Byzantium to Italy in 1427, and while the influence of his *Oeconomicus* on the evolution of Scholastic economic thought was considerable, the influence of the *Poroi* has never been charted.[53] Yet Xenophon's ideals of self-sufficiency, civic-mindedness, and economic activity as factors of public welfare echo across the *activist-idealist* tradition in which Serra wrote.

The unique emphasis on Man's role in the economic system had roots in the undercurrents of neo-Platonism in late Renaissance culture, and was an integral part of Jacob Burckhardt's vision of the Renaissance as hailing the rediscovery of the individual.[54] The classical tradition of individualism in the Renaissance was, however, never divorced from the Christian ethos that saturated society. While the charitable impulse in European thought indeed may have been reinforced by the Reformation and subsequent Counterreformation, it was never entirely absent. One could argue that the two axioms of classical individualism and Christian communitarianism reinforced each other synergistically, and the importance of collective individuality was integral to the tradition of Italian statecraft. It was a way of thought that favoured the organic coherence of the city-state—an anthropocentric doctrine whose legacy is clearly manifest throughout the entire trajectory of Italian political economy from the scholastics to the *Risorgimento*; Giovanni Botero (1544-1617), Tommaso Campanella (1568-1639), Antonio Serra (dates unknown), Antonio Genovesi (1712-1769), Ferdinando Galiani (1728-1787), Pietro Verri (1728-1797), and Cesare

[52] Isocrates, "On the Peace." In *Isocrates with an English Translation in Three Volumes*, edited by George Norlin. Cambridge, Mass.: Harvard University Press, 355 B.C/1984. Verse 19.

[53] Baron, Hans, "Franciscan Poverty and Civic Wealth as Factors in the Rise of Humanist Thought." *Speculum* 13 (1938): 25. The Latin phrase indicates that Aurispa brought the entirety of Xenophon's corpus with him from Byzantium: "omnia quicquid scripsit"; Sombart, Werner, *Der Bourgeois: Zur Geistesgeschichte des Modernen Wirtschaftsmenschen*. Munich, 1913, p. 289; Bruni, Leonardo, Gordon Griffiths, James Hankins, and David Thompson, *The Humanism of Leonardo Bruni: Selected Texts*. Binghamton: Medieval & Renaissance Texts & Studies in conjunction with the Renaissance Society of America, 1987: pp. 300-311.

[54] These undercurrents of neo-Platonism and their influence on the role of Man in society are discussed by Kristeller in two of his essays; Kristeller, Paul Oskar, "The Dignity of Man" and "Renaissance Platonism." In *Renaissance Thought and Its Sources*, edited by Michael Mooney. New York: Columbia University Press, 1979; Burckhardt, Jacob, *Die Cultur der Renaissance in Italien: Ein Versuch*. Leipzig: E. A. Seemann, 1869.

Beccaria (1738-1794) were all touched by the communal consciencethat sprang out of the 'body politic'. This school created what Werner Sombart calls the *activist-idealist* – rather than the *passivist-materialist* – tradition of economic thought.

2. Development as paradigm shifts: stage theories in time and geography[55].

> *There is a startling difference between the life of men in the most civilised province of Europe, and in the wildest and most barbarous districts of New India. This difference comes not from the soil, not from climate, not from race, but from* the arts*.*
>
> Francis Bacon, *Novum Organum*, 1620.

The two most important casualties of neo-classical economics are the dimensions of time and geography. History and geography were both integrated parts of pre-Smithian economics, and as we shall see in this section, in pre-Smithian economics the idea of human progress found parallel expressions both in history and geography through the *stage theories*. We would argue that these stage theories – remnants of which are still found in the late Adam Smith – are theoretical tools that are similar to Perez' and Freeman's paradigm shifts.

Stage theories in time.

History - it has been said - was created to prevent everything from happening simultaneously. History implies that events happen in sequence. Stage theories are attempts, based on different criteria, to organize history in sequential stages. In their most general form, stage theories postulate *that a key factor in the process of socio-economic development is the mode of subsistence*, i.e. what, how, and with which tools a society produces. Stage theories are successors to earlier historical theories that tended to be circular[56], but are frequently used in combinations. The Perez/Freeman system of paradigm shifts can be seen as a combination of both elements: progress and cyclicality combined. Stage theories are tools that can be used to study both the qualitative changes in the division of labour over time, and the processes of institutional design and change that accompany these changes.

[55] These aspects are discussed more in detail in Reinert, Erik S., 'Karl Bücher and the Geographical Dimensions of Techno-Economic Change', in Backhaus, Jürgen, (Editor) *Karl Bücher: Theory - History - Anthropology - Non-Market Economies*, Marburg, Metropolis Verlag, 2000.

[56] A classical example of circular theories of history is the mediaeval theories of Ibn-Khaldun. Se Reinert (2000)

Stage theories point towards areas where the focus of human learning is concentrated at any point in time, and as such they serve as a basis for a qualitative understanding of processes of techno-economic change and of income inequality. An integrated part of this 17th and 18th Century understanding was that the arrow of causality went from mode of production to institutional settings, not the other way around. As the quote from Francis Bacon above hints at, production – *the arts* – would determine the differences in civilization and living standards. This could be contrasted with the present view that the de-industrialized or non-industrialized nations of the Third World should 'get their institutions right'. Although clearly seeing this as a process of co-evolutions, in pre-Smithian economics the mode of production would give rise to institutions, not the other way around.

Theories of periods and stages have been used in most of the social sciences. In the history profession the material from which Man's tools were made (e.g. stone or bronze) has become universally accepted as the basis for establishing early historical periods: the Stone Age (Mesolithic, Neolithic), the Bronze Age. Other criteria could have been used, e.g. based on social organisation, but *the technology variable* was chosen. Not only in the history profession, but also in anthropology, the idea that technology is an important determinant for society is an old one; the discussion of the relationship between irrigation and centralised government being a classical example. In political science, the idea of stages of Man's development is born – with Jean Bodin's (1530-1596) study of the Republic – with the commencing of the science itself. If we define sociology as starting with Auguste Comte (1798-1857), the idea of stages was there from the very beginning of that science as well. In economics, theories of stages were central both to the important French economist and statesman Robert Jacques Turgot (1727-1781) and in the teachings of[i] Adam Smith (1723-1790).

In his book on the early stage theories from 1750 to 1800, Ronald Meek goes so far as to suggest that 'there was a certain sense…in which the great eighteenth-century systems of 'classical' political economy in fact *arose out* of the four stage theories.'[57] In spite of this, today any idea of economic stages is peripheral, almost alien, to the economics profession. In this paper we shall explore stage theories as they relate to economics, and discuss their usefulness from the point of view of understanding human welfare.

English Stage Theories (18th Cent.) German/US Stage Theories (19th Century)
(Adam Smith) (Friedrich List/Richard Ely)

[57] Meek, Ronald, *Social Science and the Ignoble Savage*, Cambridge, Cambridge University Press, 1976, p. 219. Emphasis in original.

1. Age of Hunters	1. Age of Hunting
2. Age of Shepherds	2. Age of Pasturage
3. Age of Agriculture	3. Age of Agriculture
4. Age of *Commerce*	4. Age of Agriculture and Manufacturing

This kind of stage theories is useful also in order to understand the important issues of population and sustainable development. The pre-Columbian population of North America – consisting essentially of hunters and gatherers - has been estimated at 1-2 million people, whereas the pre-Columbian population of the Andes, having reached the agricultural stage, has been calculated at 12 Million. This gives a population density 30-60 times higher in the apparently inhospitable Andes than on the fertile prairies. The concept of sustainability is not very meaningful until the technology variable is introduced.

Techno-economic paradigms should in our view be seen as continuations of this way of thinking: that the prevailing technologies and modes of production at any time will shape society and its institutions. In terms of achieving economic development, it was obvious to most pre-Smithian that it was necessary to get into the economic activities where the productivity explosions could be observed – into the paradigm carrying industries of any period. After all, a nation finding itself with a comparative advantage in stone-age technology – even if there were demand for their products – would be seen as specializing in staying poor and 'primitive'.

Stage theories: From time to geography.

In his work on cities, German economist Johann Heinrich Gottlob von Justi (1717-1771) laid out the stage theory – which until then had been formulated along an axis of time – along a geographical axis[58]. Justi arranges economic geography in terms of concentric circles from the center to the periphery. At the core of a state is the city, where the increasing return activities, manufacturing, take place. That such a manufacturing center was the necessary core of any nation-state was obvious at the time. Outside the city walls were the areas dedicated to growing vegetables and other crops, further out lay the areas for pasturage and furthest out the areas for hunting. In essence, we see the 18th Century stage theories also converted into economic geography, where the economic activities are laid out with the latest and most wealth-creating activity at the center, with the previous

[58] Justi, Johann Heinrich Gottlob von, *Gesammelte Politische und Finanzschriften über wichtige Gegenstände der Staatskunst, der Kriegswissenschaften und des Cameral- und Finanzwesens.* 3 volumes, Copenhagen & Leipzig, Rothenschen Buchhandlung, 1761-1764. Vol. 3, pp. 449 ff.

economic stages of economic development are laid out in circles in reverse historical order: manufacturing, agriculture, pasturage and hunting.

German economist Heinrich von Thünen (1783-1850) is normally credited with the discovery and use of concentric circles and thus with the 'discovery' of human geography [59]. We would argue that economic geography was at the core of economics already with Giovanni Botero (1589) and Antonio Serra (1613), and Serra explains how increasing returns is the main reason behind the wealth of the cities.

Coupling the spatial theory of Justi and von Thünen with trade theory, we find that both in the geographical center of their spatial construction and at the core of their development theory were the increasing returns of the manufacturing sector. Both to Justi and to von Thünen the welfare of the whole state depended on the welfare of the manufacturing sector at the center of the economic system that was geographically spread out in the concentric circles. In spite of being a gentleman farmer, von Thünen agreed that manufacturing industry needed, for a time, both targeting, nurturing and protection. Increasing returns were only to be found in the manufacturing sector that was also the urban sector.

Lately Paul Krugman had entered into the realm both of trade theory and economic geography, and essentially reformulated important elements in mercantilist economic geography and trade theory, in his works on international trade theory (1990) and economic geography (1995). Krugman's 'New Trade Theory' of the 1980's (Krugman 1990) is the trade theory also of Justi and von Thünen. Both Justi and von Thünen understood that the development machine at the core of the concentric circles – the urban increasing return industries (manufacturing) – needed to be targeted, nourished and protected. Krugman had all these elements at hand, and – in our humble view – the logical consequence of this insight would have been to sacrifice economic equilibrium in order to gain relevance. However, Krugman failed to arrive at the same logical conclusion as Thünen and Justi.

Sacrificing equilibrium would have meant sacrificing the Archimedean Point of mainstream economics, and also the device that gives economics a claim to being more 'scientific' that the other social sciences. By introducing a situation where some nations specialize in increasing return activities and others in diminishing return activities – which is a core phenomenon of mercantilism, of colonialism and of today's Third World poverty problems – equilibrium and the generalized claims of economics would have to be abandoned.

[59] Wilhelm Roscher also recognizes Justi as being the inventor of the concentric circles that are later attributed to von Thünen. (Roscher 1868: 97).

3. Development as Rents.

Giovanni Botero (1589) was probably the first economist and social scientist who built an economic and social theory around the observation that the world was not a zero-sum game: that the gain of one actor did not have to be the loss of another. From the very beginning, it was clear that the main force that brought the world out of the zero-sum mode, was manufacturing industry. We shall later, in section 6, return to the questions of why the primary sectors were not seen as possible carriers of national wealth.

The great economic riddle of the 16th Century was why all the gold and silver that entered Spain from its American colonies, did not stay in Spain. The wealth found its way to places like the Netherlands and Venice, while Spain itself was de-industrialised. The economists of the time can roughly be divided in two groups: those who attacked the symptoms of this (i.e. the outflow of gold), and those who investigated the real economy in order to find the reasons behind the surprising reallocation of wealth. Those who investigated the causes rather than the symptoms all came to the same basic conclusion: economic wealth-creation was activity-specific; it was only possible with certain types of economic activities rather than with others. In this period – starting with Henry of Navarre in France and Henry VII in England – national economic strategies became focused on copying the conditions that clearly lead to so much economic success in Venice and the Netherlands, and avoiding the type of conditions that were found in Spain.

In his *Ragion di Stato* (1589) Giovanni Botero writes that "such is the power of industry that no mine of silver or gold in New Spain or Peru can compare with it, and the duties from the merchandise of Milan are worth more to the Catholic King than the mines of Potosi and Jalisco. Italy is a country in which… there is no important gold or silver mine, and so is France: yet both countries are rich in money and treasure thanks to industry." (Botero 1588: 152). [60] Also Tommaso Campanella, Neapolitan author of the utopian *Città del Sole*, argued for the encouragement of national industries on the basis that they were 'more prolific than mines'.[61] This same insight, that the 'real

[60] *ibid.* p. 152; the use of the Potosi mines to highlight the importance of manufactures becomes a Leitmotif in early modern political economy across Europe. For example, we find Geronymo de Uztariz in 1751 proclaiming "[Manufactures] is a mine more fruitful of gain, riches, and plenty, than those of Potosi." Uztariz, Geronymo, *The Theory and Practice of Commerce and Maritime Affairs*. 2 vols. Vol. 1. London: John and James Rivington, 1751: p. 9.

[61] Campanella, Tommaso, and Edmund Chilmead. *A Discourse Touching the Spanish Monarchy : Wherein Vve Have a Political Classe, Representing Each Particular Country, Province, Kingdome, and Empire of the World, with Wayes of Government by Which They May Be Kept in Obedience. As Also, the Causes of the Rise and Fall of Each Kingdom and Empire. Vvritten by Tho. Campanella. Newly Translated into English, According to the Third Edition of this Book in Latine*. London: printed for Philemon Stephens and are to be sold at his shop at the Gilded Lion in Paul's Church-Yard,

gold mines are manufacturing industry' we find 150 years later, in 1747, in the work of the first Swedish professor in economics, the first professorship in economics outside Germany, Anders Berch. [62] As we shall see later, Antonio Serra (1613) was the economist who exposed the mechanisms that explain *why* this is so. Unfortunately, the non-monetary side of pre-Smithian economic policy – the part which is interesting from a National Innovation System point of view - has received very little academic attention.[63]

Rents in three types of activities.

One of the more curious aspects of the present mainstream theory of capitalism is that the model depicts a very unsuccessful capitalism, one where very little profits are made, if any. 'Perfect competition' is, to a businessman, the pits, a 'hostile market'. Both with English and later US economic theory the world powers – the main beneficiaries of rents and imperfect competition – hold up to the world a picture without any such rents as the goal and standard of the economy. The 'Empires' defend themselves with a theory where all the characteristics that create an empire – imperfect markets, imperfect information, monopoly powers and the economies of scale in the use of force – are absent.

To early economists successful economies collected rents. Thorstein Veblen has compared capitalism to an advanced for of piracy, but with the Renaissance there were profits – or rents – that were not necessarily reducing the wealth of others. These rents emanated particularly from a diversified manufacturing sector (see the section on synergies). These were not the only rents, however. Our proposition is that early economic development in all the most successful European states – Venice, the Dutch Republic and England – was able to harvest three *different* kinds of rents which, to the nations in question, increased the size of the economic pie. We only have room for a brief outline.

The three kinds of rents are:

- Manufacturing rents, at the core of which are increasing returns which are absent in agriculture (see below)
- Long-distance trading rents.

1653; Discussed in Fornari, Tommaso. *Delle Teorie Economiche nelle Provincie Napolitane dal Secolo XIII al MDCCXXXIV*. Milano: Hoepli, 1882: p. 165-191.

[62] Berch, Anders, *Inledning til Almänna Hushålningen, innefattande Grunden til Politie, Oeconomie och Cameralwetenskaperna*, Stockholm, Lars Salvius, 1747. For an account of Berch and the teaching of economics in 18th Century Sweden, se Liedman, Sven-Eric, *Den Synliga Handen* (the visible hand), Stockholm, Arbetarkultur, 1986.

63 One of the very few exceptions is Perrotta, Cosimo, *Produzione e Lavoro Produttivo nel Mercantilismo e nell'Illuminismo*, Galatina, Congedo Editore, 1988 & 'Is the Mercantilist Theory of the favorable balance of trade really erroneous?', in *History of Political Economy*, Vol. 23, 1991, No. 2, pp.301-336. See also Magnusson, Lars (1991), *Merkantilismen. Ett ekonomiskt tänkande formuleras*, Stockholm, SNS Förlag, 1991, English edition: *Mercantilism: The Shaping of an Economic Language*, London, Routledge, 1994.

- Raw-material based rents, which are different in each case

In Venice the raw-material based rent was from salt. Fredrik Lane comments that the young Venetian Republic hesitated to go to war, but was always determined in defending the saltpans under its domination. Salt was the first non-luxury long-distance commodity traded, and the control of salt has been important from Ancient China to the Mayas of Yucatan. Due to the power that the control of salt supply brought with it, this commodity was often brought under government control, e.g. in Ancient China. The importance of salt for the finance and growth of the Venetian Republic is well documented in Jean-Claude Hocquet's *Il Sale e la Fortuna di Venezia* (Hocquet 1990).

In The Dutch Republic the raw material controlled was fish. As we shall see, there is a Schumpeterian element in this raw material in the discovery of pickling, or salting, of herring by William Buerem, who died in 1347. (Huet 1722: 25). Contemporary authors like Huet (who was born in 1630) and Uztariz, the great Spanish economist (1751), emphasise the importance of the synergies between fisheries and manufacturing in the Netherlands: that manufacturing alone would not have created the same wealth as manufacturing and fisheries do together.

In England the raw-material based rent was wool, the control and use of which founded the basis for the economic strategy of the Tudors, starting in 1485. The export taxes put on wool were an important element in the Tudor strategy of industrialising England, insuring that her competitors had higher raw material costs than England had herself. Daniel Defoe (1728) interprets a vision of the first Tudor monarch Henry VII, who came to power in 1485, to industrialise on the basis of assuring England's competitors having more expensive raw materials than the English manufacturers. While encouraging English woollen manufacturers, Henry VII slowly increased the export duties on raw wool. Under Elizabeth I, when sufficient manufacturing capacity had been built up, wool export was prohibited. The effect of these policies can be seen in Florence, where they caused the Medici to diversify into silk.

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Triple-layer rent-seeking.

These types of rents spread through the labour markets through various mechanisms. The new activities require more skill, there is more competition for labour, alternative ways of making money raise the wage level, and – as in the 19th century United States – a 'high wage strategy' becomes a political priority. As these rents increase, the tax-base of the nation also increases. Among German Cameralists, it was observed that people working with machinery were able to pay higher taxes that those who were engaged only in manual work, and advanced manufacturing and advanced technology therefore became a logical part of a strategy to raise the incomes of the state.

We suggest that the pie-increasing rents collected by successful businessmen spread also to the workers and to the state: thus it operates at three levels – a triple level rent-seeking: the *capitalists*, the *workers*, the *government*. It is crucial to understand why agricultural rent does not spread in the same way (see below) i.e. why – under certain circumstances – the trickle-down theory of economic development actually works. These 'rent-sharing mechanisms' are at work even today. In East Africa today, the cleaning women working in the brewery or in the tobacco factories have wages approaching the salaries of high-level public employees. The 'industrial system' 'forces', through various mechanisms, a form of rent-sharing. On the other hand, the owners of the coffee plantations in the same area are not forced to share their rent with those who pick coffee beans, who are the poorest workers in these nations. Reinert (1980 and others) explores these mechanisms.

Triple helix synergies.

At the risk of overstretching the triple metaphor, we would like to refer to the concept of a Triple Helix model of knowledge production. (Leydesdorff & Etzkowitz 1998). Their model describes the advancement of the endless frontier of new knowledge: relations among social, economic and scientific development in a Triple Helix of University-Industry-Government relations.

As so many insights, the Triple Helix has clear roots in continental mercantilism. There is strong evidence that the role of science was stronger in the consciousness of the early social scientists on the Continent than in England.[64] Johann Heinrich Gottlob von Justi (1717-1771), probably the most influential German-speaking economist in the 18th century, made 'The inseparable connections between the flourishing of the sciences and the means which makes a nation powerful and happy' the subject of his inaugural lecture at the Theresianum University in Vienna in 1750: *Rede on dem unzertrennlichen Zusammenhange eines blühenden Zustandes der Wissenschaften mit denjenigen Mitteln, welche einen Staat mächtig und glücklich machen.* [65]

[64] See e.g. Herder, Johann Gottfried, *Vom Einfluss der Regierung auf die Wissenschaften, und der Wissenschaften auf die Regierung,* 2nd edition, Berlin, Georg Jakob Decker, 1781.

[65] Published in Justi, Johann Heinrich Gootlob von, *Auf höchsten Befehl an Sr. Röm. Kaiserl. und zu Ungarn und Böhmen Königl. Majestät erstattetes allerunterthänigstes Gutachten von dem vernünftigen Zusammenhange und practischen Vortrag aller öconomischen und Cameralwissenschaften; wobey zugleich zur Probe die Grundsätze der Policeywissenschaft mit denen dazu gehörigen practischen Arbeiten vorgetragen werden; benebst einer Antrittsrede von dem Zusammenhange eines blühenden Zustandes der Wissenschaften mit denjenigen Mitteln, welche einen Staat mächtig und glücklich machen,* Leipzig, n.p., 1754.

4. Development as Synergies and Path Dependency.

> *'Promoting husbandry..is never more effectually encouraged than by the increase of manufactures'*
>
> David Hume, when discussing the Reign of Henry VII, in his: *History of England,* 1768, Vol. III, p. 65.
>
> *'So true it is, that when commerce has once changed its course, it is the most difficult thing in the World to bring it back again.'*
>
> Pierre Daniel Hüet (1630-1721), *A View of the Dutch Trade in All the States,* 1722.

È il bene comune che fa grandi le città', says Machiavelli (1469-1527), and this 'common weal' was, as we have seen above, a natural outcome of the human body as a metaphor for society. Daniel Defoe (1660-1731) in his *Plan of English Commerce* gives us a *systemic analysis* in the same type of reasoning when he tells his readers what convinced Henry VII (1457-1509) to start an English textile industry when he came to power in 1485: While living with his aunt in France, the future King of England had observed that not only were the French textile producers (who got all their raw materials - wool and Fuller's Earth- from England) much richer than their English providers of raw materials, but that wealth **spread to the whole community**: where there was manufacturing, also the shop-keepers were richer. There were synergetic effects between manufacturing industry and the common weal of people ***outside*** the manufacturing sector. The quote from David Hume, Adam Smiths best friend, above, indicates that also Hume thoroughly understood the synergetic effects that Henry VII had started. Following Defoe there is a whole school of English historians who see Henry VII, or Henry Tudor, as being the launching pad from which England's greatness later developed. At the core of the Tudor strategy – later perfected by Elizabeth I – was the idea that some economic activities spread wealth, other don't. Here, as in the rest of Renaissance Europe, wealth was seen as *activity specific*.

There are several arguments founded on this kind of **systemic synergy** caused by manufacturing. The quote on the first page from Adam Smith's *Theory of Moral Sentiments* - from before his meeting with the French physiocrats - shows him as a relatively traditional mercantilist in this aspect. The reasons given by German philosophers and statesmen Leibniz and Wolff for why a State is needed, includes an emphasis on ***learning*** which triggers positive systemic effects. The reason why there is so little conflict between the interest of the individual and *the common weal* in their system is precisely that increased knowledge produces more of both individual and collective

profits, something like: 'The incoming tide (of knowledge) raises all boats'. Wolff observes that 'Some people collect knowledge like other people collect money', and indicates the benefits to society of putting these two types of people together.

The most remarkable of all economic treatises before Adam Smith is, in these authors' opinion, no doubt the 1613 book by Antonio Serra, 'A Brief Treatise on the Causes which can make Gold and Silver Plentiful in Kingdoms where there are no Mines'[66]. The title corresponds to our stereotypes of mercantilist tracts, that they are only about gold and silver.[67] In fact Serra produces a most sophisticated model, producing - on the one hand - systemic economic development, and on the other hand underdevelopment.

Serra's starting point is knowledge. On the dedicatory page he denounces 'ignorance as the cause and starting point of all evil'. He further comments on 'everybody's innate desire for knowledge'. He outlines the plan of his work as 1. Understanding why some nations, even though they have no mines, are very rich, and 2. Based on this understanding, to explain the apparent paradox that his own nation, the Kingdom of Naples, although abounding in natural resources has reached such an abysmal level of poverty that 'it does not leave us to breathe nor to enjoy what nature has given us'. Serra s the first economist to describe increasing returns,[68] and with the increasing returns as his starting point, he describes positive feedback mechanisms which lead to virtuous circles of development in a national system.

We would argue that the most mercantilists had a systemic view of society, and that – with different degrees of sophistication – they saw the synergetic and cumulative interaction of the triple factors mentioned above as being the true engines of growth and welfare. The quote from David Hume above is typical. It is also interesting to see how these ideas travelled to the 'periphery' of Europe. The subject of 'how one economic activity influences another' was the subject of a Ph.D. thesis in Åbo (Turku) in Finland in 1772.[69] Indeed, after the first two professorships in economics had been established in Germany in 1728, the first professorships in economics outside Germany were established in the 'periphery', in Naples (Antonio Genovesi) and in Uppsala, Sweden (Anders Berch). A professorship in economics was established in Åbo, Finland about 50 years before the first such professorship in England.

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

[67] The title also influenced Say, who erroneously claims that to Serra only gold and silver were the sources of riches, see Coquelin & Guillaumin's *Dictionnaire de l'Économie Politique,* Paris, Guillaumin & Hachette, 1854, p. 610.

[68] Both Wilhelm Roscher in his *Principles of Political Economy,* Chicago, Callaghan, 1882, and later Schumpeter recognise this, see his *History of Economic Analysis,* New York, Oxford University Press, 1951, p. 258-259.

[69] Gadd, P.A. (1772), 'Försök til en politisk och economisk avhandling om näringarnes samband och medvärkan på hvarandra', Åbo (Turku), F. Brandell, Ph.D. Thesis, Åbo Akademi.

These cumulative mechanisms create strong path dependency, and therefore, as Huet says above, once commerce has changed its course it is very difficult to get it back. Joshua Gee, in his 1729 treatise, presents a similar argument:

> ‘The Trade of a Nation is a mighty Consequence (sic), and a Thing that ought to be seriously weighed, because the Happiness or Misfortune of so many Millions depend upon it. **A little Mistake in the Beginning of an Undertaking may swell to a very great one**. A Nation may gain vast Riches by Trade and Commerce, or for Want of due Regard and Attention, may be drained of them’ (emphasis added).

Antonio Serra (1613) has two types of factors which cause the wealth of nations: 1. Particular (or specific) factors (*accidenti propri*), and 2. Common (or general) factors (*accidenti communi*), which may occur in any nation:

Particular factors:

The first particular factor in Serra's system is a **surplus of products** for export. His phrase 'The surplus (*soprabbondanza*) of goods which are produced in a kingdom in excess of its own needs and conveniences' reminds us of an Adam Smith type of 'vent for surplus' theory of international trade, but this is only the beginning of Serra's long and sophisticated reasoning. Serra explains that he lists this as a *particular* factor - rather than as a *general* or *common* one, by pointing out that a surplus - or a positive balance of trade - cannot apply to all nations. His second particular factor is **the geographical position** (*il sito*) of the nation 'relative to other kingdoms and parts of the world....being a potent occasion, and almost a cause, of extensive trading of a kingdom'. Rating nations according to their geographical position, 'Venice holds the first place.'

General factors:

Serra lists four common or general factors which bring wealth, and, most importantly, *how these factors interact* with each other and with the *particular* factor of the geographical position of a nation listed above. These 'general factors' we could refer to as man-made comparative advantages. It is worth noting that Serra sees the barrenness of a state – its lack of God-given comparative advantages – as an important trigger factor for creating the much more valuable man-made **general** comparative advantages:

1. The ***number and variety of industrial professions*** (*La quantità degli artifici..diversi*). We see the 'number of professions' as fundamentally the same concept as 'the division of labour'. Clearly ***the number of industrial professions*** in a nation is a symptom - and a proxy - of a variety of economic factors: technological sophistication, a sophisticated pattern of demand, a large diversity of skills, and - due to a minimum efficient scale of production in each profession - of a large market. Serra rates this factor higher than the 'vent for surplus' factor which he has listed under particular factors. This is because to Serra industrial professions, most importantly, behave differently from agriculture. The variety of employment in the Dutch Republic is frequently mentioned at the time.
2. **The *quality of the population*** (*la qualità delle genti*), or what we have later listed under Mentalité. The quality of a population is good 'when the inhabitants thereof are by nature industrious, or diligent and ingenious in building up trade not only in their own industry, but outside, and on the watch for opportunities to apply their industry.' On this factor Genoa gets the highest score, followed by Florence and, only third, Venice, which 'though it has more commerce than all the cities of Italy together, will nevertheless hold third place with respect to this factor.'

Serra clearly relates the barrenness of the Genoese republic (*il loro paese sterilissimo*) to their industriousness and their wealth. We shall later see that in France Montesquieu later makes the same point, which becomes very common well into the 19th Century.

3. ***The presence of a great commerce*** (il traffico grande). Here we find Serra's description of how the various factors creating wealth interact and mutually reinforce each other in creating virtuous circles of development. In the case of Venice, 'she is aided by her extensive manufactures; a factor which brings a great many people there, not only because of the trades themselves, in which case the effect would be attributed to them, but also as a result of **the concurrence of these two factors together, because one gives strength to the other**, the great concourse due to commerce and due to the geographical situation being increased by the manufactures, and the manufactures being increased by the great concourse due to commerce, while commerce is made greater by the same concourse of people.'[70] The starting point for the virtuous circles described by Serra is to be found in the increasing returns of manufacturing, where the Dutch Republic and Venice clearly were the world leaders at the time of Serra's writing.
4. **The regulations of the State.** (la provvisione di colui che governa). Here Serra emphasizes the role of government policy in order to create national wealth. This is a most difficult task, he says, because one policy measure can have very different effects in different industries: 'like the sun makes clay hard, but makes wax soft, like a low whistle which irritates the dog, but quiets the horse.' (One could here e.g. think of an economic policy assisting innovation by *subsidising research*, which would greatly benefit the pharmaceutical industry, but not at all help the printing industry, whereas a policy of *subsidising the purchasing of advanced machinery* would help the printing industry, but hardly affect the pharmaceutical industry.) In spite of these difficulties, Serra makes it clear that economic policy is the most important factor causing the wealth of nations.

Daniel Defoe, in his *Plan of English Commerce* (1728) expresses a somewhat simpler, and perhaps more naïve, system of cumulative causation where the interactions of manufactures and navigation mutually reinforce each other:

'Manufacture supplies Merchandise
Navigations supplies Shipping,

[70] '..ma ancora giova la quantità dei artifici che in essa si ritrovano, il di cui accidente causa concorso grandissimo di gente, non solo per gli artefici, mentre in tal caso a quelli si attribuirebbe la causa, ma per il **concorso di questi due accidenti insieme, poiché l'uno somministra forza all'altro**, e il concorso grande che vi é al rispetto del traffico e della ragione del sito cresce per la quantità degli artefici, e la quantità degli artifici cresce per il concorso grande del traffico, il quale per il concorso predetto diventa maggiore.'

Manufacture is the Hospital which feeds the Poor
Navigation is the Nursery which raises Seamen
Manufacture commands Money from Abroad.
Navigation brings it Home
Manufacture leads the Ships out
Navigation loads them in
Manufacture is Wealth
Navigation is Strength.

'To conclude, Manufacture for Employment at Home, and Navigation for Employment Abroad, **both together**, seem to set all the busy World at Work; **they seem to joyn Hands** to encourage the industrious Nations, and if well managed, infallibly make the World rich' (Defoe 1730: 68-69, emphasis added)

A less complicated way of expressing the necessity and interrelationship of several factors at once is to refer to them as 'pillars', as does Pieter de la Court – 'The Dutch Adam Smith – about the Dutch Republic in his *Interest van Holland*[71]. Still the metaphor of pillars clearly conveys the message that they are all necessary elements.

> 'Navigation, the fishery, commerce, and manufactures are **the four pillars of the State**; that these ought not to be weakened nor incommoded by any incumbrance whatsoever; for it is they (sic) make the inhabitants to subsist, and enrich the country, by bringing into it foreigners of all sorts &c.' (emphasis added)

Building the state and building the economy were seen as being two aspects of the same process. The mercantilist project was essentially to enlarge the territory where systemic synergies could be observed from the city-state to a larger economic area: the nation-state. In this process economics, law, political science, and all the auxiliary social sciences melt into one, into what in German was called the Cameral Sciences (*Cameralwissenschaften)*, a term we find translated and used both in Italy, Spain and Sweden. Gustav Schmoller has described the process as follows:

> 'What was at stake was the creation of real *political* economies as unified organisms, the center of which should be, not merely a state policy reaching out in all directions, but rather the living heartbeat of a united sentiment. Only he who thus conceives of mercantilism will understand it; in its innermost kernel it is nothing but state making – not state making in the narrow sense, but state making and national-economy making at the same time; state making in the modern sense,

[71] Court, Pieter de la (Jean de Wit), *Interest van Holland*, Amsterdam, n.p., 1662.

> which creates out of the political community an economic community, and so gives it a heightened meaning. The essence of the system lies not in some doctrine of money, or of the balance of trade; not in tariff barriers, protective duties, or navigation laws; but in something far greater: – namely in the total transformation of society and its organization, as well as of the state and its institutions, in the replacing of a local and territorial economic policy by that of the national state.'[72]

Nationalism was clearly an important element in this, an element to which two recent books contribute.[73] Creating nationalism, starting all the way back with Henry VII of England in 1485 and continuing through to Korea in the 1960's, was also a struggle against regional interests of the landed oligarchy, whose comparative advantage was in diminishing return activities. The fight for the artisans in the towns against the feudal order, although often defeated, as in Spain in 1520-21[74], was also the fight for those who had their competitive advantage in increasing rather than in diminishing return sectors. Those nations with no natural resources had a clear advantage, because there the urban societies grew with no resistance.

The absence of natural resources (which would have led into diminishing returns) forced nations like The Dutch Republic and Venice into urban conglomerations, high population density (a very important element in mercantilist economics), manufacturing and increasing returns. The fact that the absence of God's gifts was actually a blessing, was observed early on by economists, along with the fact that lack of nature's gifts created a thrifty people[75]. Similarly, the involuntary protection of boycotts has played an important role historically in establishing increasing return activities: In spite of Alexander Hamilton's theories, US manufacturing did not really take off until the Continental Blockades of the Napoleonic Wars reduced imports by between 80 and 90 per cent, Latin American industrialisation was kick-started by the scarcity of manufactured imports during World War II, and the apartheid-related embargoes on South Africa and Rhodesia made manufacturing flourish. The fall in real wages in Rhodesia/Zimbabwe after the boycott ended was remarkable.

Giving the word to Schmoller again:

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[72] Schmoller, Gustav, *The Mercantile System and its Historical Significance*, New York, Macmillan, 1897, p. 50-51(reprinted 1967, Kelley).

[73] Greenfeld, Liah, *Nationalism. Five Roads to Modernity*, Cambridge, Mass., Harvard University Press, 1992 & Greenfeld, Liah, *The Spirit of Capitalism. Nationalism and Economic Growth*, Cambridge, Mass., Harvard University Press, 2001.

[74] The War of the *Comuneros*.

[75] Montesquieu, for example, explains the backwardness – the lack of 'industry or arts' – of Africa with two factors, 'gold in abundance' and scarce population. *The Spirit of the Laws*, Hafner, New York, 1949, p. 332.

> ‘The struggle against the great nobility, the towns, the corporations and provinces, the economic as well as the political blending of these isolated groups into a larger whole, the struggle for uniform measures and coinage, for a well-ordered system of currencies and credit, for uniform laws and uniform administration, for freer and more active traffic with the land – this was it (sic) which created a new division of labour, a new prosperity, and which liberated a thousand forces towards progress.’ [76]

5. Development as Synergies and Diversity: The case of 17th Century Delft.

Different fixed costs incurred in learning skills and in new tools, simultaneously create *diversity* and *minimum efficient sizes* of human societies. For example, the fixed costs created by the blacksmith's fire created a minimum efficient size for human settlements. The creation of new knowledge is facilitated by the *diversity* of economic activities, all of which are subject to some type of minimum efficient size. In the words of Arthur Koestler: 'New knowledge is created by connecting previously unconnected facts' [77]. This is another element that increases both the role of a *minimum efficient size* and of *diversity* – two factors that mutually reinforce each other – in human societies. We can take for granted that with increasing diversity in an economy, the possibility of connection points for new knowledge (Koestler’s *bisociation*) – both conscious and products of pure serendipity – will grow as exponentially as Malthus’ assumed population growth. The larger the number of economic activities, the larger the division of labour, the larger will be the potential for spillovers.

The strong urban bias that we can observe in early economic growth supports this idea, as does Serra’s (1613) idea that a larger division of labour *per se* is a starting point for cumulative causations of growth. Already Xenophon, in his *Poroi*, hinted at these ‘systemic increasing returns’ when he claimed that certain problems in a city may be cured by increasing the size of the city.

Historically such knowledge-creation and spillovers often leap from activities that are seemingly completely unrelated. In 17th Century Holland, it is possible to identify a closely-knit maritime-scientific-artistic cluster where innovations leap to and from seemingly unrelated sectors centred in the City of Delft. One interesting aspect of a case study of Delft is that it brings together, in the very same productive-scientific cluster, the sectors and

[76] Schmoller, *op.cit*., p. 51.
[77] Koestler, Arthur *The Art of Creation*, London, Macmillan, 1964.

elements that are traditionally seen as being the important driving forces of capitalism, all in an interwoven whole:

- The quest for military, in this case naval, power, as in Werner Sombart's 'Krieg und Kapitalismus'.[78]
- The quest for luxury, in this case art, as in Sombart's 'Luxury and Capitalism'. [79]
- The quest for scientific knowledge, as in Thorstein Veblen's 'idle curiosity'.

In Delft, these three forces all interact in creating economic development, and a central profession uniting all three seemingly unrelated fields is the profession of *lens grinder*.

Dutch artists invented oil paining and painting on canvases. The raw materials for these inventions – linseed oil, linen and hemp fibre – were widely used in Dutch shipbuilding and readily available. They would not be as readily available to the artists of Florence and Sienna. Whereas Venice was the center for artistic glass, Florence under the Medici was an early center for scientific glass production for lenses. Later Delft emerges as an important center for lenses, making important improvements to the microscope[80]. Florence and Delft, then, shared both advanced painting and lens grinding. The two main users of lenses for scientific work, Galileo Galilei (1564-1642), from a Florentine family, and Antoni van Leeuwenhoek (1632-1723) from Delft, both shared a family background in the wool business.[81] This industry was the 'paradigm carrier' of the day, of 'Kontratiev 0', indicating the ties between successful manufacturing and successful science. Galileo's father had been in the wool business, while Leeuwenhoek had himself worked in the textile industry in Amsterdam, where hand lenses were used extensively to inspect cloth. Leeuwenhoek – also an active natural scientist – was to produce more than 500 microscopes during his career,

An interesting integration of art and lens-making – bringing together the history of art and the history of science – is started by Delft painter Jan Vermeer (1632-1675), whose painting techniques included seeing his motives through lenses and a *camera obscura*, almost a primitive camera.[82] Vermeer

[78] Sombart, Werner , Krieg und Kapitalismus, Munich & Leipzig : Duncker & Humblot, 1913.
[79] Sombart, Werner, *Luxus und Kapitalismus*. Munich & Leipzig, Duncker & Humblot, 1913. See also Sombart's key work on capitalism, *Der moderne Kapitalismus*, Munich & Leipzig : Duncker & Humblot. First edition in 2 volumes 1902, last edition in 6 volumes 1928. Partial Spanish translation: *El Apogeo del Capitalismo*, Mexico, Fondo de Cultura Economica, 1946, 2 volumes. Partial Italian translation, *Il Capitalismo Moderno*, Torino, Unione Tipografico-Editrice Torinese, 1967.
[80] Ruestow, Edward G., *The Microscope in the Dutch Republic: The Shaping of Discovery*, Cambridge, Cambridge University Press, 1996.
[81] Huerta, Robert D, *Giants of Delft. Johannes Vermeer and the Natural Philosophers: The Parallel Search for Knowledge during the Age of Discovery*, Bucknell University Press, 2003, p. 33.
[82] Steadman, Philip, Vermeer's Camera, Oxford, Oxford University Press, 2001.

also keenly participated in the aspects of discovery that were surrounding him in Delft: the geographical discoveries through the Dutch navy and the discoveries in the natural sciences that were made possible by the improvements of the microscope in Delft by Leeuwenhoek and his colleagues.

The navy and the merchant marine created a demand for lenses for binoculars, but lenses were also in demand by natural scientists and the producers of early microscopes at the time. Antoni van Leeuwenhoek (1632-1723), who lived a couple of hundred meters away from the painter Vermeer, was famous for his microscope lenses and his research correspondence. Upon Vermeer's death, Leeuwenhoek was appointed to deal with his estate. The Huygens family, who later improved on the microscope, used another lens grinder in Delft, Johan van Wyck. Vermeer, the painter, who also experimented in the natural sciences, joined the microscope builders *cum* natural scientists.[83] The Delft lens grinders thus formed a core of an extremely dynamic and path-breaking cluster including such diverse activities as the Navy (binoculars), painters like Vermeer, the natural scientists, and the microscope builders. The philosopher Baruch Spinoza (1632-1677), born in the same year as Vermeer and van Leeuwenhoek, but in Amsterdam, added to the Dutch knowledge system of the time. When Spinoza was excommunicated and banished from the city by the Amsterdam rabbis in 1656, also he supported himself as a *lens grinder* – as a producer of optical lenses.

Another product linking the three clusters – war (navy), luxury (art) and 'idle curiosity' (science) – in Holland at the time was mapmaking. Holland's position as a seafaring power demanded not only binoculars and naval instruments, but also up-to-date maps. Vermeer fascination with maps and explorations are clear in many of his paintings, one author commenting on his 'mania for maps'. His rendering of maps and globes are extremely accurate, and his paintings have been used to argue for the existence of certain maps before the originals were discovered.[84] In Florence this connection between art and cartography had already been developed by Filippo Brunelleschi (1377-1446), the famous architect of the cathedral *cupula* that symbolises the city.[85] When the technology of map printing changed from woodcuts to copperplates in the late 1500's, the artisans of the Netherlands – who were skilled metalworkers – took over from the Italian mapmakers. In the working with brass and copper another aspect of the scientific-maritime-artistic cluster is reinforced. The same metalworking skills are needed for the production of

[83] See Huerta, Robert D, *Giants of Delft. Johannes Vermeer and the Natural Philosophers: The Parallel Search for Knowledge during the Age of Discovery***,** Bucknell University Press, 2003.
[84] Huerta, page 90.
[85] Huerta, page 91.

naval as for scientific instruments, whereas art and metalworking meet in the production of the copperplates used in printing maps.

Such synergetic cumulative causations and the path dependency they create are no doubt at the core of knowledge creation and the process of economic growth. They are, however, neither possible to reproduce in any meaningful way by quantitative methods nor visible through the lenses of methodological individualism.

The enormous diversity of economic activities was observed and commented on as an asset by all the contemporary economists who wrote about the Dutch Republic[86]. The role of diversity and the resulting creative serendipity brings back the issue of 'monoculture' in traditional development economics and in agricultural societies. A community of milk producers or a nation of banana producers have very little to sell to each other.

6. Patents, protection and the mercantilist policy toolbox.

Profit Opportunities as the Real Engines of Growth: Understanding Patents and Protection.

Since patents and protection have a common origin, both conceptually and historically, it is difficult to understand how one of these institutions – targeting certain activities through protection – today should be seen as a mortal sin, whereas targeting the same type of activities, for the very same reason, through patents, is seen as a great feature of capitalism. Both policy measures were invented and put into systematic use between 1480 and 1500. From the point of view of the perfect competition of neo-classical economics, both institutions – patents and protection – are of course equally abominable. Why is it that economics has accepted one but not the other of these two gross inconsistencies with perfect competition?

The crucial role of patents in the 'free trade' system of today is an involuntary admission that dynamic Schumpeterian rent-seeking is essential to the capitalist system. Patents – that ingenious 15th Century Venetian innovation – are necessary in order to make it profitable to use new knowledge which would otherwise have easily been copied, making research and development in these areas unprofitable and have seriously hampered economic growth. The fact that patents are of a temporary nature, just as protectionism was for the 'greatest of all protectionists' – Friedrich List – only emphasises the similarities between patents and protection: they are both used in order to introduce new technologies and new learning into an economy, they are both

[86] See Reinert, Erik S, 'The Dutch Republic (1500-1750) as seen by Contemporary European Economists', paper presented at the conference on 'The Political Economy of the Dutch Republic', Utrecht University, April 2003.

there in order to create profit opportunities for businessmen in an industrial sector or in a geographical area. As long as all factors of development are globalised except the labour market, and as long as the benefits from technical change do not all translate into lower prices to foreign consumers (see our next point), the theoretical defence of patents is no better than the theoretical defence for protection. Protection is like patent focused in one geographical area, in one specific labour market.

From the point of view of the businessman or entrepreneur the basic requirement for starting a business is a 'profit opportunity'. This must consist of a product idea and a potential market. Patents were created in order to make new inventions profitable, and protection was created in order to facilitate the transplant of the same inventions into new geographical areas. In the more backward countries knowledge was lacking and markets were small, and the two factors had to be cultivated in parallel. It was clear at the time that basing the nation on 'competitiveness' in the agricultural sector – as we shall see under the discussion of agriculture – was not an option for growth. The logic that factor-price equalisation will be achieved between a nation of subsistence farmers and an industrialised nation – or between a nation of shoe-shine boys and a nation of bio-engineers – is a modern invention that only came with the Cold War. The pre-Ricardian logic was rather that if all farmers are poorer than all those employed in manufacturing (which could be observed), the average income of the nation would go up if more manufacturing industry was added. To this came the belief – in our view realistic – that an agricultural nation would have a shortage of foreign exchange, a trade deficit, which would prevent all the necessary manufactured good.

Below we have attempted to list the 'Schumpeterian' toolbox of the mercantilists:[87]

[87] From: Reinert, Erik S, 'The Role of the State in Economic Growth', in *Journal of Economic Studies*, vol. 26, No. 4/5, 1999, available on www.othercanon.org A shorter version published in Toninelli, Pier Angelo (editor) *The Rise and Fall of State-Owned Enterprises in the Western World*, and Cambridge University Press, 2000.

Figure 1. Schumpeterian Mercantilism:
Promoting and Protecting New Knowledge **in the Economic Policy of the Renaissance (starting in the 16th Century).**

The Establishment of Scientific Academies.
- Bacon's 'New Atlantis': Salomon's House.
- Leibniz: Inspires the establishment of the academies of Berlin, Vienna and St. Petersburg.

Encouragement and Assistance to Inventors.
- Bacon: 'Upon every invention of value we erect a statue to the inventor, and give him a liberal and honourable reward.'
- Wolff: 'We should forbid mockery of inventors.'

Diffusion of new Knowledge/Education.
- Bacon: 'We have circuits of visits, of divers principal cities of the kingdom; where as it cometh to pass we do publish such new profitable inventions as we think good.'
- Wolff as the 'educator of the German Nation'

Establishing an Apprentice System
- In England under Elizabeth I (1533-1603)
- In Germany as a result of the teachings of Leibniz and Wolff.

Patent Protection for new Inventions.
- Showing a sophisticated understanding of the *appropriability problem* of new knowledge.

State-owned Manufactures as 'Places of Learning'
- Emphasised by Werner Sombart.

Subsidies to Firms in Industries new to the Nation or Region.
- Serra: the number of different professions as a key factor in explaining the wealth of a city.

Tax Breaks and Bounties to Firms bringing in new Technology.
- Systematically applied in England starting under Henry VII in 1485.
- Import of skilled labour

Travel Restrictions for skilled Labour.
- Under penalty of death for certain skills in Venice.

Prohibition against the Export of Machinery.

- In force in England until the 1830's.

Prohibition against the use of Machinery in the Colonies.
- The heritage of this economic policy is still felt in many Third World counties, which, like Haiti, are specialised in the economic activities which have not yet been mechanised.

Export Duties on Raw Materials
- ensuring that local manufacturing industries have lower prices on raw materials than foreign competitors.

Import Duties on manufactured Goods, while national Competition insured.
- machines seen as a proxy for new knowledge, this measure maximises the flow of capital and labour to activities producing with machines, not manual power.

Strengthening the Navy.
- taking advantage of 'the economies of scale in the use of force'.

7. The cult of manufacturing and the support of agriculture.

> ***'From the raw materials from Spain and the West Indies – particularly silk, iron and cochinilla (a red dye) – which cost them only 1 florin, the foreigners produce finished goods which they sell back to Spain for between 10 and 100 florins. Spain is in this way subject to greater humiliations from the rest of Europe than those they themselves impose on the Indians. In exchange for gold and silver the Spaniards offer trinkets of greater or lesser value; but by buying back their own raw materials at an exorbitant price, the Spaniards are made the laughing stock of all Europe'.***
>
> Luis Ortiz, Spanish Minister of Finance, to Felipe II: 'Memorandum to the King to prevent money from leaving the Kingdom', Madrid, 1558.
>
> '***It's the eternal paradox - the poor live in nations which are rich from Nature's bounties'***,
>
> José Cecilio del Valle, economist and vice president of the short-lived Central American Republic. About 1830.

> ***'The higher the civilization of a people, the less does it depend on the nature of the country'***,
>
> Wilhelm Roscher, German economist and inspirer of Marx and Schumpeter, founder of the 'New Historical School' of Economics in Germany. About 1860.

Perhaps the most important assumption in neo-classical economics is what Nobel Laureate James Buchanan calls 'the equality assumption', the failure of this theoretical tradition to recognize diversity. Creating a taxonomy – a classification system – was an important task for early scientists, and we believe that it also is the case for neo-Schumpeterian economics. Economic activities are not qualitatively alike as carriers of economic growth. As was already pointed out by Giovanni Botero in 1589, the possibilities for developing new products – Carlota Perez' 'windows of opportunity' – vary considerably from one economic activity to the next. Technological trajectories evolve, leaving behind pockets of economic activities in exhausted techno-economic paradigms, technological dead-ends bereft of any scale effects or potential for change. Creative destruction may cause destruction in Bengal and creativity in Manchester; these are all factors which in our view could be built into a Schumpeterian economic geography'. In addition, when evaluating the differences between economic activities it is important to keep in mind Antonio Serra's classification of economic activities into two different groups: those where unit costs go up when a nation specializes in the activity (diminishing returns) and those where unit costs go down after national specialization, and where important barriers to entry to imitators are created (increasing returns)

A key feature of economics and state-building during the 1600's and 1700's – up until the physiocrats and Adam Smith – is what we would call the *cult of manufacturing*: the conviction that a manufacturing sector, as diversified as possible, was necessary in order for a nation to achieve economic growth. Perhaps the earliest written testimony pointing to the 'cult of manufacturing' is the 1558 report from Luis Ortiz, Spain's Minister of Finance, to his King (quoted above). As Friedrich List put it: 'the principle *sell manufactured goods*, *buy raw materials* was for centuries the English substitute for an (economic) theory'[88]. One basis for this policy was Charles King's very influential taxonomy of 'good' and bad 'trade'[89] This policy tool reflected trade policy, not only in England, but in the whole of Europe, starting in the late 1400's. In France, later a bastion of 'the cult of manufacturing', we find the

[88] List, F. (1841/1959) *Das nationale System der Politischen Ökonomie* (1841), Basel, Kyklos Verlag, p. 12. This part of the foreword has not been translated in the English translation of 1885.
[89] King, C. (1721) *The British Merchant; or, Commerce Preserv'd*, London, John Darby, 1721, 3 volumes.

earliest theoretical work with Barthélemy Laffemas in 1597.[90] 'Good trade' consisted in importing raw materials and exporting manufactured goods, 'bad trade' consisted in importing manufactured goods and exporting raw materials. Exchanging manufactured goods for other manufactured goods was also considered 'good trade'. Also from a fiscal point of view this policy was a success: the people working with machinery were able to pay higher taxes than the manual artisans. Charles King's taxonomy makes sense if manufacturing is associated with increasing returns and raw materials are associated with diminishing returns, as in Frank Graham's 1923 model[91] and in Krugman's 'new trade theory'.

In 19th Century US tariff policy, King's Taxonomy achieved a higher level of sophistication: Raw materials were, as in the old logic, to enter the country free of duty, but tariffs on manufactured goods were to be **gradually increased with increasing skill level of the workers.** A very clear statement of this principle is found in a resolution which was passed by the Democratic National Convention in Chicago in 1884, and which came to dominate US tariff policy:

> '*First* - The abolition of all duties on raw materials, such as wool, iron, and other ores, coal, jute, hemp, flax, dye stuffs, etc., in order that we may compete in home and foreign markets with other manufacturing nations, not one of which taxes raw materials.
> *Second* - The adjustment of the tariff, so that manufactures approaching nearest to the crude state will pay a lower rate, and manufactures that are further advanced, requiring more skill and labour, will pay a higher rate of duties.'[92]

This type of tariff policy is, in our view, fully consistent with a National Innovation Systems approach. In this world-view – which dominated for centuries - wages in the agricultural sector were seen as a reflection of the wages in the manufacturing sector. The research of Thomas Cliffe Leslie – an important economist of the English Historical School – confirms this: 'the chief causes of high agricultural wages are proximity to great industrial centres'[93]. This was partly because the proximity of a manufacturing sector advanced agricultural techniques, partly because of the additional demand created, and partly because the higher industrial wages increased the wages in agriculture.

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90 Laffemas, Barthélemy, *Reiglement (sic) general pour dresser les manufactures en ce rayaume, et couper le cours des draps de soye, & autres merchandises qui perdent & ruynent l'Estat: qui est le vray moyen de remettre la France en sa splendeur, & de faire gaigner les pauvres.*.., Paris, Claude de Monstr'oil and Jean Richter, 1597.

91 Graham, Frank, 'Some Aspects of Protection further considered', in *Quarterly Journal of Economics,* Vol. 37, 1923, pp. 199-227.

92 Quoted in Reinert, Erik S., 'Compensation mechanisms and targeted economic growth – Lessons from the History of Economic Policy, in Vivarelli, Marco and Mario Pianta (editors), *The Employment Impact of Innovation,* London, Routledge, 2000.

93 Leslie, T.E.C. (1888) 'The Movements of Agricultural Wages in Europe', in *Essays in Political Economy,* Dublin, Hodges, Figgis & Co, p. 377.

Today we can observe the same relationship between the manufacturing sector and the traditional service sector.

Also modern economic historians recognize the problem of originating economic growth starting in the agricultural sector. Alexander Gerschenkron observed that the hope of developing industry from agriculture is probably not realistic. [94] Albert Hirschman put the same point in a different way by accusing agriculture for its inability to create linkage effects, the superiority of manufacturing in this respect being crushing. [95] However, Paul David found that in the US Midwest agriculture had contributed importantly to the industrialisation of Chicago[96]. Emilia-Romagna in Italy is an area where high-tech and successful agriculture share a territory, but – given the very long manufacturing traditions in the area – it is not clear at all that the synergies originally went from agriculture to manufacturing.

One important difference between agriculture and industry is their behavior in the business cycle: agriculture is generally the sector hardest hit and the last to recover. John Kenneth Galbraith[97] reports how differently the depression in the 1930's hit manufacturing and agriculture. In industry, protected by the imperfect competition in all markets, depression created unemployment, but wages were upheld for those who kept their job. As a result wages and salaries actually increased as a percentage of GDP during the depression. In agriculture the price level and income collapsed, in addition to the employment problems. This development can be traced through the parity price relationship between prices and the cost of inputs in the agricultural sector. This index was set as base 100 in the years 1909 to 1914. In 1918, as a result of World War I, the index was at 200: agricultural prices were doubled compared to the costs of inputs. In 1929 this relationship was down to 138, and in 1932 it was down to a miserable 57. Compared to 1918 the prices the farmers got for their products compared to the costs of their inputs *was down by more than 70 per cent.* Those who have read John Steinbeck's 'Grapes of Wrath' will know the spirit of the day. Wesley Clair Mitchell, in his huge volume on Business Cycles, comments that agriculture and grazing normally are the sectors which come out of the business cycles last. He also comments on another anomaly in agriculture: the fluctuations of volumes and prices are such that sometimes a failed harvest, due to the rise in prices, causes the total value of the crop to be higher than in a large and good harvest.[98]

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[94] Gerschenkron, Alexander, *Economic Backwardness in Historical Perspective*, Cambridge, Mass., Harvard University Press, 1962, p. 215.
[95] Hirschman, Albert O., *The Strategy of Economic Development*, New Haven, Yale University Press, 1959, pp. 109-110.
[96] David, Paul A, 'The Mechanization of Reaping in the Ante-bellum Midwest', i Rosovsky, Henry (editor), *Industrialization in two Systems: Essays in Honour of Alexander Gerschenkron,* New York, Wiley, 1966, pp. 3-39.
[97] Galbraith, John Kenneth, The World Economy Since the Wars, London, Mandarin, 1994.
[98] Mitchell, Wesley Claire, *Business Cycles*, Berkeley, University of California Press, 1913, p. 239.

Figure 2 shows the relative wages of the three main sectors of the economy in the period 1928-1936. It is evident that in most countries the wages of the industrial sector are pulling the wages in the rest of the economy. This is, of course, the reason why industrialized countries started protection of not only their manufacturing, but also their agriculture. However, it is important to keep in mind that these two types of protection were born at very different periods for very different reasons: One to pull up the wages of the country, the other to protect the laggards. [99]

Figure 2. Industrial wages pulling the wages in the rest of the economy. Purchasing power of a median salary in primary-, secondary, and tertiary sectors in 10 countries, 1928-1936. [100]
Secondary (= Industrial) Sector = 100

	Primary	Secondary	Tertiary	
England, 1930	72	100	93	
USA, 1935	40	100	142	
France, 1930	36	100	32	
Norway, 1934	24	100	58	
Japan, 1934	15	100	39	
Italy, 1928	70	100	114	
Sweden, 1930	25	100	80	
Australia, 1935-36		96	100	79
Germany, 1928	54	100	115	
New Zealand 1936		113	100	78

The mercantilist policy, however, was not *against* agriculture. To the contrary, the promotion of agriculture was in everyone's interest, and the number of texts with advice on how to improve agriculture is large. There are more

[99] See Reinert 1980 for a discussion of this.
[100] Calculated from Clark, Colin, *The Conditions of Economic Progress,* London, Macmillan, 1940.

translations into German of English agricultural economist Arthur Young than there are of Adam Smith.

For centuries however, agricultural productivity in Europe did not develop very much. The productivity development was nothing compared to the impressive new machinery in manufacturing and the 'productivity explosions' brought in by new techno-economic paradigms. The hope for innovation was still there, but the important thing was to use the existing land efficiently.

Phillipp von Hörnigk[101], the most successful economist in the German-speaking area, starts his nine points on how to improve the Austrian economy – essentially a list on how to build manufactures – like this:

> **First**, to inspect the country's soil with the greatest care, and not to leave the agricultural possibilities of a single corner or clod of earth unconsidered. Every useful form of *plant* under the sun should be experimented with, to see whether it is adapted to the country, for the distance or nearness of the sun is not all that counts.

Friedrich List went out of his way to explain how protection could only meaningfully be applied to manufacturing:

'The Protective System, as we understand it, can only be applied to the cultivation (*Pflanzung*) of manufacturing power. Any limitation on the import of raw materials and agricultural (food) products will in the long run hamper the development of manufactures, and is therefore against the interests of the Protective System. This is the case even if for some time such measures stimulate certain branches of agriculture and certain areas for some time. ...The development of Manufacturing Power follows completely different laws than the development of Agricultural Power.' (This is exactly Antonio Serra's argument when he explains the wealth of Venice and the poverty of Naples). List continues: ' To make this clear, we shall for the moment only outline how differently import duties influence prices of the two branches (manufacturing and agriculture). When manufacturing is being cultivated, the prices of manufactured goods will rise (due to import duties), but as a result of the growing national manufacturing power and the increased competition resulting from this, the prices will, in time, be lower than they would have been through foreign imports'.

'Applying import duties to agricultural products, on the other hand,' List says, **'does not have this invigorating power; such duties do not lead to**

101 Hörnigk, Philipp Wilhelm von , *Oesterreich über alles wann es nur will. Das ist: wohlmeinender Fürschlag Wie mittelt einer wolbestellten Lands-Oeconomie die Kayserl. Erbland in kurzem über alle andere Staat von Europa zu erheben, und mehr als einiger derselben, von denen andern Independent zu machen. Durch einen Liebhaber der Kayserl. Erbland Wolfahr*, no place, no publisher, 1684.

lower prices later on. This flaw in their reasoning (*Denkfehler*), like the mixing up of cosmopolitical with political economy, the (English) school has inherited from the physiocrats.**'**

Understanding the 'National Innovation System' that Friedrich List tried to build, also requires understanding why List was in favour of free trade in agriculture[102]: this economic activity, by itself, could not build higher wages, regardless of productivity improvements. Clearly an important argument behind this is that only through manufacturing will a nation be able to create a) the synergetic increasing returns that only could arise through a critical mass of increasing return activities, the core of the virtuous circles of development (Antonio Serra's 1613 argument), and b) only in manufacturing could the ratchet wheel/stickiness effect of wages be created. The imperfect competition both in the market for knowledge, for products, and for labour – all protected by increasing barriers to entry created by increasing returns and cumulative learning – has been a precondition for this strategy to work, and also for what the French regulation school calls the 'Fordist' system of spreading the fruits of technological change.

To List, the fact that with the repeal of the Corn Laws in 1846 the English – by ending their protection of agriculture – seemed for a while to be able to convince the rest of the world that they should stop protecting *manufacturing,* must have seemed like a big defeat to his thinking and his life-work. The repeal of the Corn Laws was, to List, a very successful deceit which totally failed to take into account how the English themselves had got rich by employing, for centuries (since 1485), the very same policies that they were now denying to the rest of the world. This is what List sees as the English 'kicking away the ladder' from the nations that are attempting to follow their path from poor to rich nation, an argument that is still very valid. This is one connotation of the term 'free trade imperialism'. Going through List's correspondence, it seems likely that this event contributed to his suicide a few months later.

In our opinion Malthus and Ricardo and their 'dismal science' were right when only the correct circumstances are specified: human wages will for the great masses always be around subsistence level in the absence of the virtuous circles that emanate from a cluster of diversified increasing return activities. The historical record on this is unanimous: only nations with Schumpeterian type activities (see figure 2 above) are able to work themselves out of poverty. However, nations with a manufacturing sector are able to create a decent living standard by exporting agricultural products.[103] The existence of

[102] See Reinert, Erik S. 'Raw Materials in the History of Economic Policy; or, Why List (the Protectionist) and Cobden (the Free Trader) Both Agreed on Free Trade in Corn.', Parry, G. (editor), *Freedom and Trade. 1846-1996.* London, Routledge, 1998.
[103] The illuminating debate on this in Australia is discussed in Reinert 1980.

famines provides an interesting perspective to this. Famines are only found in nations where a high percentage of the population is engaged in agriculture. The smaller the percentage of agriculture in GDP, the smaller is the likelihood of famines. In nations where agriculture is only a small portion of GDP, people tend to die from eating too much rather than from famines. This is an illustration of the extreme synergies between agriculture and the rest of a diversified economy.

In the way of summary of this short section on a most complex issue: We argue that there are essentially two kinds of economic activities, having very different characteristics. A nation specialising in Schumpeterian activities, will find that both increasing returns and technological change will cause production cost to fall, and thus open up for technology-based rents which can be divided between capitalists, workers and the government. A nation specialising in Malthusian activities will find that, after a certain point, specialization will cause unit production costs to rise. This is the core of Antonio Serra's argument from 1613, where he explains the wealth of Venice and the poverty of his native Naples. Reinert (1980) showed that the main export activities of Peru, Ecuador and Bolivia were actually producing well into diminishing returns: when production was reduced, production costs were also reduced. This is a main mechanism explaining why nations exporting raw material – in the absence of a national manufacturing sector – have never managed to get out of their poverty trap.

Figure 3. How economic activities differ:
Only the presence of Schumpeterian Activities has ever managed to raise a nation out of poverty

Marshall Plans:	Morgenthau Plans:
Produced by focus on	Produced by focus on
Schumpeterian Activities	**Malthusian Activities.**
(= 'good' export activities)	**(= 'bad' export activities if no Schumpeterian sector present)** [104]
Increasing Returns	Diminishing Returns
Dynamic imperfect competition	'Perfect competition' (commodity competition)
High growth activities	Low growth activities

[104] 'Globalisation in the Periphery as a Morgenthau Plan: The Underdevelopment of Mongolia in the 1990's, in Lhagva, Sakhia, *Mongolian Development Strategy; Capacity Building*, Ulaanbaatar, Mongolian Development Research Center, 2000. Also forthcoming in Reinert (editor), *Globalization, Economic Development and Inequality: An Alternative Perspective*, Cheltenham, Edward Elgar, 2004. Available on www.othercanon.org

Stable prices	Extreme price fluctuations
Generally skilled labour	Generally unskilled labour
Creates a middle class Irreversible wages ('stickiness' of wages)	Creates 'feudalist' class structure Reversible wages
Technical change leads too higher wages to the producer ('Fordist wage regime')	Technical change tends to lower price to consumer
Creates large synergies (linkages, clusters, spillovers)	Creates few synergies

The problem today seems to be that, under a system of free trade combined with the standard IMF conditionalities, a large number of nations will not be able to build increasing return activities that are competitive on the world market. The risk today, in our opinion, is therefore that a large number of countries will remain specialized in raw material monoculture and therefore specialize in being poor. When the United States and Australia started building their manufacturing sectors, at different times during the 19th century, they did not proceed with a view to competing with English manufactured goods. At the time, it is clear from their writings that they saw that as being impossible.

Today this centuries-old strategy of creating your own sub-optimal and globally uncompetitive manufacturing sector in order to raise wages, employment and agricultural efficiency is no longer possible: the rule is 'be globally competitive or die'. This is in our view a situation that results in most poor countries being extremely far from their production possibility frontier: huge resources, especially labour, are unemployed. In many countries only 20-30 percent of the population have what Europeans would call 'a job'. This extremely important fact is hardly ever discussed – the prices reflected in the market are not the true prices in this case – but only a handful of papers have ever been produced on the implications of this.[105] Under the original Bretton Wood rules, this situation entitled nations to protect their own production in order to raise employment.

[105] We are indebted to Daniel Schydlowski for this point.

8. Colonialism in the framework of a National Innovation System approach.

In our view it is useful to look at colonialism from a National Innovation System point of view. European colonial policy was the logical outgrowth of 'the cult of manufacturing': the essence of the colonial system was to prohibit manufacturing in the colonies, which to some extent was mirrored by the prohibition of colonial activities in the Metropolis (the growing of tobacco was e.g. forbidden both in England and Ireland).

The colonial system was a natural outgrowth of mercantilist policy:

> '…the ideal colony was one which would have freed England from importing anything from her competitors. In addition, the supplies obtained from the plantations were not to be entirely consumed in England, but their surplus was to be exported to foreign countries to the manifest advantage of the nations's trade balance. As far as it was possible the colony was to differ from England in its economic pursuits, producing nothing that interfered with the fullest development of any English industry and trade. It was to be the economic complement of the mother country, both together constituting a self-sufficient colonial empire. It naturally followed that the colony was to purchase its manufactures from England and thus employ English labour. But while its value as a market was fully recognized, chief stress was laid upon the colony as a source of supply'[106]

To this was added what has come to be called 'The Colonial Drain', the consistent huge surplus of the balance of trade in the colonies' favour. In 1668-1669 England's imports from her colonies amounted to 605.574 pounds while her export to the same colonies amounted to 107.791 pounds.[107]

Economists before Adam Smith generally understood that the colonies were getting a very poor deal economically. Some of them, as we shall see, felt the need to defend colonies morally with the argument that, yes, this is bad, but other nations do it so we have to do it as well in order not to be left behind. The reactions from the latecomer Germany are also important in this respect. While 17th Century German economists, like Johann Becher[108], are pushing for Germany to have colonies of her own, the attitude 100 years later is very different. Johann Heinrich Gottlob von Justi (1771-1771) [109], the most

[106] Beer, George Louis, The Old Colonial System 1660-1754, New York, MacMillan, 1912. Vol. I, p. 38.
[107] Ibid., p. 39.
[108] Becher, Johann Joachim, Politischer Discurs, 1668.
[109] See Reinert, Erik S., 'Johann Heinrich Gottlob von Justi (1717-1771) – The Life and Times of an Economist Adventurer.', on www.othercanon.org

influential German economist in the 18th Century[110], shares the opinion of the English that the only useful colonies are those that are only engaged in agriculture. As other economists before Smith and Ricardo he is aware of the fact that such arrangements *are not in the interests of the colonies themselves*. Knowing that manufacturing is the key to wealth, this insight is an obvious part of the logic of the mercantilist system. Justi realises that colonial trading arrangements hurt the colonies themselves and therefore cannot be a lasting proposition. ***It is only a matter of time before the colonies will find out that they are being deliberately kept in poverty: colonies will 'always will be in danger as soon as the foreign people starts getting wiser***' [111]. No one could foresee the long-term success of Adam Smith's argument that all economic activities were equally conducive to economic growth; indirectly indicating that a successful economic agglomeration like Silicone Valley could equally well have been based on the growing of bananas.

From the point of view of pre-Smithian economics, colonialism was is a kind of *winner-picking* in reverse. The activity-specific view of economic growth cannot be fully appreciated without this other side of the coin – preventing 'good trade' in the colonies. Prohibition of the use of machinery in the colonies was one important and common policy measure. The English prohibition of the very successful cotton textile production in Ireland, starting in 1699, is an outstanding example of the negative targeting – the *winner killing* rather than the *winner picking* aspect of mercantilism. Export of cotton textiles from Ireland was prohibited, and Ireland was assigned the much more labour intensive production of linen. One of the pamphlets lobbying for the legislation prohibiting the export of woollen textiles from Ireland, argues that since Ireland was able to produce woollen manufactures cheaper than England, woollen manufacturers in England would be unemployed and will have to go to Ireland for work, 'which means that in time the whole Trade would most probably be Establishd there, and lost here' [112] Because the colony threatened the manufacturing base of the mother country, manufacturing had to be shut down in the colony. In order to defend this *targeted underdevelopment,* the author of 1698 lists the measures of the other European colonial powers in order to show that these countries in no way treat their colonies better than the English treat Ireland. The full title of this pamphlet, in the footnote, gives important clues to the essence of colonialism, which still today is not well understood.

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[110] One of the persistent myths in the history of economic thought is that German Cameralism did not influence economic thinking in the rest of Europe. Of the total of 67 books written by Justi, 8 different books were translated into 5 different languages in 13 different translations.

[111] This is supported by Roscher, *op. cit*, p. 91.

112 Clement, S. , *The Interest of England, as it stands with the trade of Ireland, considered; the arguments against the bill for prohibiting the exportation of woollen manufactures from Ireland to forreign parts, fairly discusst, and the reasonableness and necessity of England's restraining her colonies in all matters of trade, that may be prejudicial to her own commerce, clearly demonstrated*, London, John Attwood, 1698.

As regards colonialism, Adam Smith and David Ricardo represent a real water-shed in economics. It is only with their barter-based – rather than production-based – economic theories that colonialism becomes morally defensible. Perhaps the greatest novelty in Adam Smith is that he makes all economic activities ***qualitatively alike*** as carriers of economic growth. Only with this theoretical innovation can world trade – as it is today – be pictured as a system that creates automatic harmony. Colonialism became defensible only within an economic theory where national wealth grows independently of what the nation produces.

Adam Smith's attempts to convince his readers that all economic activities are of equal quality as carriers of economic growth, is perhaps the least convincing part of the *Wealth of Nations*. In order to create this proof, Smith has to make the creation of knowledge into a zero-sum game: 'the cost of apprenticeship accounts for the wages of manufacturers being higher than those of country labour.'[113]. There are therefore no advantages to manufacturing over agriculture, although the earnings in manufacturing 'may be somewhat greater, it seems evidently, however, to be **no greater than what is sufficient to compensate the superior expense of their education**'(emphaiss added). In other words, the mercantilist tradition that nations who export the products from professions of higher skills will be wealthier than nations exporting products with low skills is here – really for the first time – strongly refuted. From the point of view of both society and the individual, adding knowledge to labour is, in Smith's system, clearly a zero-sum game[114]. Here Adam Smith's views stand in deep contrast to the 18th century continental economic tradition, where the cult of new knowledge is a key feature.[115]

Sometimes Adam Smith – the mercantilist – contradicts Adam Smith the liberalist. While the importance of knowledge is belittled throughout the *Wealth of Nations* – one of Smith's points of attack is against the apprentice system instituted by Elizabeth I – in this context, when it comes to convincing the world about the unimportance of manufacturing, the cost of knowledge, 'the superior expenses of their education' as Smith says, which is needed to get into manufacturing is so high as to make manufacturing unprofitable for other nations'. When it comes to warfare, a similar contradiction appears. In one section of his great book, Adam Smith claims that only a nation with manufacturing capacities will be able to win a war, while in another sections he claims that an attempt by the American Colonies to get into manufacturing

[113] Smith 1776/1976: page 114

[114] This aspect in Adam Smith's work – making, for the first time, economic activities qualitatively alike- is discussed in Reinert, Erik, 'The Role of the State in Economic Growth.', in *Journal of Economic Studies*, vol. 26, No. 4/5, 1999. A shorter version is published in Toninelli, Pier Angelo (editor) *The Rise and Fall of State-Owned Enterprises in the Western World*, and Cambridge University Press, 2000.

[115] See Reinert, The Role of the State in economic growth, 1999, section 9, for a discussion.

will not be to their advantage. No wonder parts of Adam Smith's Wealth of Nations was viewed with healthy scepticism on the continent and in the United States throughout the 19th Century.

9. Schumpeter on pre-Smithian economics.

> 'The usual attitude towards what it has been agreed to call 'mercantilism' is double unjust: either it is denounced for comprising a notion it continually criticised (the intrinsic value of metal as the principle of wealth), or it is revealed as a series of immediate contradictions: it is accused of defining money in its pure function as a sign while insisting upon its accumulation as a commodity; of recognising the importance of quantitative fluctuations in specie, while misunderstanding their action upon prices; of being protectionist while basing its mechanism for the increase of wealth upon exchange. In fact, these contradictions or hesitations exist only if one confronts mercantilism with a dilemma that could have no meaning for it: that of money as a commodity or as a sign'
>
> - Michel Foucault[116]

Once the productivity explosions of the first industrial revolution had started snowballing across Europe, the painstaking groundwork of the early economists – which had taken between two and three hundred years – was expelled from what became economic theory. The welfare, the institutions, the innovations, the popular attitudes towards progress, and the mechanisms of 'good governance' that these early economists had created, started to be taken for granted, as spontaneous products of an invisible hand. With 'Adam Smith Mark II', the Adam Smith of *The Wealth of Nations*, economics became *catallectics*: the science of exchange, of supply and demand of something that has already been invented and produced outside what became the narrowly defined sphere of economics. After A. Smith converted production and trade into one category, by reducing everything to 'labour time' void of any skills or other qualities, economics became, as 19th Century German economists would complain, a science of barter consisting of *qualitätslose Größen,* quantities void of any qualities. Economics became a science of allocation of already existing wealth rather than a science of the creation of new wealth, and a *ceteris paribus* mode of thinking abstracted from the complicated, but crucially important synergies of society.

[116] Foucault, Michael (1966/2002), *The Order of Things. An Archaeology of the Human Scie*nces, London, Routledge, p. 192.

With Adam Smith the tools used in the painstaking process of creating the productive civilisation of Europe, slowly built brick by brick and institution by institution, were cancelled both from the toolbox and from the collective memory of the economics profession. As one economist put it in 1840: 'The delusion that security of life and property, the productivity of labor, and the consequent possibility of adquisition and enjoyment, and even the elevation of the spiritual and the ennobling of the moral nature - that these goods came to Man in the gift of gratuities, is itself a proof of the advanced stage of culture which the greater part of Europe at present occupies. As the grown man has long since forgotten the pains it cost him to learn to speak, so have the peoples, in the days of their mature growth of the State, forgotten what was required in order to free them from their primitive brutal savagery.' (Johann Gottfried Hoffmann, quoted in Cohn 1895: 60). In this process the economists who built the institutional foundation that made the Industrial Revolution possible disappeared as 'bad economists'. This industrial revolution was in full swing as Adam Smith wrote his *Wealth of Nations*, but there is no indication that he was aware of it.

One generation after Hoffman, Gustav Cohn, another German economist, picks up his argument and continues: 'In point of fact, how significant was the involuntary testimony which the eighteenth Century, with its repudiation of the historic State and its yearning after the primordial state of nature, bore to the blessings of the inherited culture which it ungratefully enjoyed.'(Cohn 1895: 60-61) This description – written more than 100 years ago – also fits the Zeitgeist of today, and it constitutes a serious impediment for our understanding of the continued underdevelopment of large parts of the Third World.

The 'Midas Legend' established by Adam Smith –that the economists before him were only interested in gold – became deeply entrenched in the mind of a majority of theoretical economists in the 19th century. Anyone who dared to comment positively on economic theory before Adam Smith could make Werner Sombart's words his own: 'I say this in spite of the risk of being branded as a neo-mercantilist, and as such to be transferred into the collection of
the oddities of the profession'[117]

Joseph Alois Schumpeter wrote what is certainly the most encyclopedic of all histories of economic thought, *The History of Economic Analysis* [118]. Schumpeter's analysis differs from most other such works in his lack of enthusiasm for the economics of Adam Smith. Schumpeter argues, quite

[117] 'Ich sage das auf die Gefahr hin, als Neo-Merkantilist abgestempelt und in das Raritätenkabinett unseres Faches übergeführt zu werden', Sombart, Werner, *Der moderne Kapitalismus*, Vol. 2: *Das europäische Wirtschaftsleben im Zeitalter des Frühkapitalismus,* p. 925.
[118] New York, Oxford University Press, 1954.

correctly in our view, that Adam Smith's Wealth of Nations – the most famous economics book ever – 'does not contain a single *analytic* idea, principle, or method that was entirely new in 1776'[119]. Schumpeter's comments on the physiocrats, the inspirers of 'Adam Smith Mark II', the school which today is considered the starting point of economics, were equally impolite: 'It's analytical merit is negligible, but all the greater was its success'.[120]

Schumpeter is right. Even the division of labour, Smith's engine of growth, can be traced back to Xenophon's *Poroi*, and William Petty, who died 99 years before the publication of *The Wealth of Nations,* describes the division of labour in a clock factory. The most remarkable, and at the same time most unknown precedent, however, is that of Ernst Ludwig Carl (1682-1743), a German economist in French service, who wrote a three volume work on economics more than 50 years before Adam Smith (1722-23), using the pin factory as his example for describing the principle of the division of labour, the same example that made Adam Smith famous and is assumed to be his original idea.

Schumpeter is very enthusiastic about the Italian economists who continued the Renaissance tradition of the common weal. Here are some selections:

'But the honors of the field of pre-Smithian system production should go to the eighteenth-century Italians. In intent, scope, and plan their works were in the tradition that has been illustrated by the examples of Carafa and Justi; they were systems of political economy in the sense of welfare economics—the old scholastic Public Good and the specifically utilitarian Happiness meeting in their concept of welfare (*felicita publica)*.'

'Count Pietro Verri (1728-97)… would have to be included in any list of the greatest economists… he knew how to weave fact-finding and theory into a coherent tissue: the methodological problem that agitated later generations of economists he had successfully solved for himself." (p. 178)

'Beccaria, the Italian A. Smith… Both were sovereign lords of a vast intellectual realm that extended far beyond what, even then, was possible for ordinary mortals to embrace… A. Smith's life work contains no match for *Dei delitti e delle pene*, but his *Moral Sentiments* are more than a match for Beccaria's aesthetics. (p. 179-80, see also pp. 180-181).

Equally surprising is Schumpeter's treatment of Johann Jacob von Justi (1717-1771) Schumpeter heads his section on Justi in the History of Economic Analysis with the title 'Justi: The Welfare State'[121]. Since

[119] History of Economic Analysis, p. 184.
[120] *op.cit.*, p. 175.
[121] *op.ci,*. p. 170.

Schumpeter was not particularly enthusiastic about the welfare state, his later praise of Justi is all the more significant. In the comment on Justi below, Schumpeter succinctly states a typical pre-Smithian attitude to technological change and economic policy. Justi was the first to establish economic policy and public administration as a separate science – as **Policey-Wissenschaft** – the science of policy. Schumpeter's description of Justi's economics gives us a flair of the Pre-Smithian mainstream, and indicates how Justi and his contemporaries integrated technology into their analysis:

'He (Justi) saw the practical argument for laissez-faire not less clearly than did A. Smith, and his bureaucracy, while guiding and helping when necessary, was always ready to efface itself when no guidance or help seemed needed. (Schumpeter's footnote here: 'This was not merely a dream. It will be pointed out below that the bureaucracy in the typical German principality actually tried to behave like this') Only he saw much more clearly than did the latter all the obstacles that stood in the way of its working according to design. Also, he was much more concerned than A. Smith with the practical problems of government action in the short-run vicissitudes of his time and country, and with particular difficulties in which private initiative fails or would have failed under the conditions of German industry of his time. His laissez-faire was a laissez-faire plus watchfulness, his private-enterprise economy a machine that was logically automated but exposed to breakdowns and hitches which his government was ready to mend. For instance, he accepted as a matter of course that the introduction of labour-saving machinery would cause unemployment: but this was no argument against the mechanization of production because, also as a matter of course, *his* government would find equally good employment for the unemployed. This, however, is not inconsistency, but sense. And to us who are apt to agree with him much more than we do with A. Smith, his (Justi's) vision of economic policy might look like **laissez-faire with the nonsense left out**.'(p. 172, emphasis added)

Section II: National Innovation Systems and their countervailing forces in the international economy: A brief outline.

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The interest in the history of economic policy reflected in the first section of this paper is not a result of an interest in history *per se*, but part of an attempt to understand why the presently poor nations stayed poor by understanding how the rich nations got rich. In our view the concept of National Innovation Systems is also a most appropriate tool in which to understand economic successes of the past.

A future second part of this ongoing work is a description of the forces that keep the Second and Third World today from following the same path previously followed by the rich: why recent development points to nations clustering in two convergence groups, one wealthy and one poor. This section gives a brief outline, almost in bullet point form, of what in our opinion prevents the success story of the First World to be repeated. In our view the National Innovation System approach – we would suggest also equipped with the extended toolbox of the German Historical School of economics – is a useful starting point.

Schumpeter is the economist to study in order to understand the path of virtuous circles leading Mankind towards the never-ending frontier of knowledge. However, we would argue that in order to understand the situation of the Third World we must recognize that the opposite mechanisms, uncovered by the 'dismal science' of Robert Malthus and David Ricardo are still there, alive and well, if the critical mass of increasing return activities is removed from a nation.[122] Myrdal's mechanisms of vicious circles and 'perverse backwashes' are still working, although they are not found in the nations that have established their comparative advantage in increasing return industries, from which the virtuous circles originate.

In a world where everything is globalised except the labour market, Friedrich List's distinction between the *Cosmopolitical* School of Economics, generally focused on barter and trade, and the School of *National* Economics, focusing on production, is as valid as ever before. The policies of the Washington Consensus are open to most, if not all, the criticisms List had against the Cosmopolitical School of Economics. It is particularly interesting that List, also quoting our Renaissance hero Antonio Serra (1613), rebuilds the argument of the synergies created by the cities as the cradle of personal freedom, civil liberties, above-subsistence income, democracies, the arts – in short, of civilization as we know it.

When increasing return activities are gone, whole economies may embark down the path of diminishing returns, creating a situation where, as David Ricardo predicted, wages will be hovering around subsistence level. As John Stuart Mill described it, the nation with natural resource monoculture hits a 'flexible wall' because one factor of production has its quantity and quality determined by an act of God.[123] Clearly these diminishing return activities – now more than ever before – are subject to rapid technological change.

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[122] 'Globalisation in the Periphery as a Morgenthau Plan: The Underdevelopment of Mongolia in the 1990's, in Lhagva, Sakhia, *Mongolian Development Strategy; Capacity Building*, Ulaanbaatar, Mongolian Development Research Center, 2000. Also forthcoming in Reinert (editor), *Globalization, Economic Development and Inequality: An Alternative Perspective*, Cheltenham, Edward Elgar, 2004. Available on www.othercanon.org

[123] Reinert, Erik S, *International Trade and the Economic Mechanisms of Underdevelopment*, University Microfilms, 1980, shows how the main export activities in 20th century Peru, Ecuador and Bolivia were all producing far into the realm of diminishing returns. This was shown clearly when production fell, labour productivity increased.

However, technical change in an enclave economy based on the production of raw materials – in the absence of a functioning National Innovation System – spreads in a completely different way than in a nation with a critical mass of increasing return activities.

One factor at work is that technological change in raw material production makes it profitable to utilize more marginal land and more marginal mines, so that part of the fruits of technical change is 'used up' to compensate for inferior inputs of land or ore. Another important factor is the effects of 'commodity competition' rather than 'Schumpeterian dynamic imperfect competition'. In such a situation technical change and productivity improvements are not captured in the producing nation itself. This was an essential argument of traditional development economics – probably best presented by Hans Singer, Schumpeter's student in Bonn[124]. No doubt this insight was strongly reinforced by the collapse of the agricultural prices, also in the North, during the 1930's, while prices in the industrial sector were protected from such reversals by a built-in ratchet wheel effect, created by imperfect competition both in the product markets and in the labour market ('stickiness' of prices and wages in the industrial sector).

1. National Innovation Systems vs. Global Primitivisation Systems: An uphill fight.

Once the idea of the possibility of progress, of improving the lot of mankind by adding new knowledge, innovations and their institutions, has been established, it becomes clear that the opposite phenomenon – *retrogression* or *primitivisation* – is also possible. Indeed the underlying idea of the Renaissance – of *re-birth* – is that the late Medieval world was in a suboptimal situation compared to previous achievements of Mankind. During the Renaissance the Greek texts that seeped into Italy after the fall of Constantinople were a proof of this. Another visible and tangible proof of retrogression was the sheep grazing among the magnificent ruins of ancient Rome, indeed a frequent illustration also in early travel books. Early economists recognized the urban bias of early economic growth (Botero 1588, Serra 1613) just as economic historians do today, and it was clear that Rome had retrogressed from advanced urbanism to a stage of herding and pasturage.

In the economics of Gunnar Myrdal, a corollary to the virtuous circles of development were the *vicious circles* of underdevelopment and the *perverse backwashes* that were produced in the world economy. A typical perverse

[124] Singer, Hans W., 'The Distribution of Gains between Investing and Borrowing Countries', in *International development: Growth and Change,* New York, McGraw-Hill, 1964. (Paper originally presented in 1949 and published in 1950)

backwash effect in today's world economy is that capital tends to flow from the poor countries to the rich. These effects are normally not visible in nations where increasing returns and increasing diversification and their virtuous circles have achieved a strong foothold, but they are clearly present in the context of most Third World countries. In our view, it is imperative that these countervailing effects – working against the establishment of National Innovation Systems – are taken into consideration. We have argued that these effects frequently take the form of *lock-in effects*, nations may end up being specialized in economic activities at the dead-end of technological trajectories and bereft of any scale effects. We would argue that the pattern of production and world division of labour established under colonialism set most of today's poor nations on a different path than that of the North, and that there are very strong systemic effects which today reinforce their specialization in being poor. The de-industrialisation of so many small and medium-sized peripheral nations over the last twenty years coupled with the present free trade ideology makes the establishment of ***genuinely wealth-producing NIS*** – as opposed to innovation systems where all the fruits of innovation go to the consumers in export markets – more difficult than ever before. This section is an attempt to identify and classify the elements of this systemic lock-in effect in poverty.

We would argue that dynamic mercantilist economic policy at best – in its combination of tools including a systemic furthering of innovation in most European countries through patents and protection (see Appendix I) – for so many centuries found its modern expression in the world of business in the 1970's through the work of Boston Consulting Group (BCG). This world-wide consulting firm became famous in the world of business for the creation of two tools which helped companies survive in a world dominated by dynamic Schumpeterian competition. The first tool was 'The Experience Curve', essentially a learning curve plotting total cost rather than labour hours on the vertical axis [125] The second tool was the product portfolio, a matrix where mature cash cows continuously finance innovations that in their turn become the cash-cows of the future [126]. In our view this theory emulates the cult of manufacturing and mechanisation so typical of the best mercantilists; making sure all European nations got into the cash-cows requiring new skills, creating national productivity explosions and steep learning curves. The policy towards the colonies, however, caused these nations to be stuck in what BCG calls 'dog industries', activities bereft of increasing returns, with very little growth, and with the low profitability and few linkages of commodity competition.

[125] Boston Consulting Group, *Perspectives on Experience*, Boston, BCG, 1972, Reinert, Erik S, *International Trade and the Economic Mechanisms of Underdevelopment*, University Microfilms, 1980, Stern, Carl W & George Stalk Jr., *Perspectives on Strategy from The Boston Consulting Group*, New York, Wiley, 1998.
[126] Stern & Stalk, *op. cit*, p. 37. This matrix is also found in Porter 1980.

This section of the paper, then, presents a brief outline of the forces that make it is so difficult today to reproduce the conditions that – in the North – created functioning National Innovation Systems. We attempt to produce a taxonomy of the combined cumulative negative effects of policy decisions and market forces that mutually reinforce each other and in many countries have produced economic retrogression and falling national welfare. These are the mechanisms that create vicious circles that are reproduced in a market system, and against which any attempt to create National Innovation Systems in the Third World would have to fight as a form of 'economic gravity'. In short, we argue, in the spirit of Myrdal, that there are always – and particularly at present – market-, technology-, and policy-based countervailing forces that work against any will and intention to introduce Nation Innovation Systems in the Third World. We would argue that since the early 1990's these forces are cumulatively so strong that they might be called a 'Global Primitivisation System'. The factors outlined below must be seen as being as systemic as those of a NIS, but working ***against*** development rather than in its favor, frequently mutually reinforcing each other.

2. The Washington Consensus and the reduction of diversity: De-industrialisation and the creation of de-facto Morgenthau Plans.

In the NIS approach, increasing returns, innovations, and economic diversity/large division of labour is at the core of the system (Lundvall 1992). In our view the phenomenon of increasing returns is at the core of these effects, being the key producer of dynamic synergies. We should keep in mind that Schumpeter coined the term ***historical increasing returns*** in order to discuss the combined effects of technological change and increasing returns; the two effects being separable in theory but frequently not in practice because previous technologies often do not exist in the old scale.[127] Technological change under diminishing returns – where the supply of one factor of production is limited and produced in different qualities by an act of God – although frequently formidable, obey different rules, as we have argued previously.

Since the late 1980's, de-industrialisation has been a key feature of a large number of developing countries, particularly small and medium-sized. Reinert (forthcoming 2004) contains case studies of the Mongolian and Peruvian economies documenting this phenomenon. Mongolia was the best pupil of the Washington Institutions, and opened up the country for trade almost overnight in the early 1990's. The result is that a large number of Mongolian manufacturing industries have seen their volume of output contract by more

[127] This raises the issue of minimum efficient sizes of production. One could perhaps argue that the latest techno-economic paradigm has reduced the minimum efficient size of production (in the sense of batch sizes) but perhaps raised the minimum efficient size of production *systems* in many areas?

than 80 per cent, and many branches of industry have disappeared completely. In other words, the nation has both been de-industrialised and de-diversified. The only manufacturing industry that has shown an increase in production in Mongolia is the collection of bird-feathers, producing combed down. Closing steel-mills and increasing the collection of bird feathers is in our view an example of *primitivisation* of an economy.

We have recently argued [128] that two ideal types of economic policies may be established – one based in increasing return activities and the other in nations without any increasing return activities – one creating virtuous and the other creating vicious circles in the economy. We have named economic policies that create the vortices of, respectively, wealth and poverty after two types of economic strategies that were developed and – like the atomic bomb – tried out in the field in the 1940's: Marshall Plans and Morgenthau Plans. We shall claim that virtual virtuous circles of development are the result of a set of policies that we refer to generically as Marshall Plans. The opposite effect, vicious circles, is the result of Morgenthau Plans.

The purpose of the Morgenthau Plan – named after Henry Morgenthau Jr., the US Secretary of the Treasury from 1934-1945 – was to prevent Germany, which had caused two wars in the 20th Century, ever from starting a war again. This was to be achieved by de-industrialising Germany and make it a pastoral state, taking all industrial machinery out of Germany and filling the mines with water. The plan was approved in an Allied meeting in 1943 and carried out after the German capitulation in May 1945.

The Morgenthau Plan was abruptly stopped in Germany in 1947 when ex-President Herbert Hoover of the United States reported back from Germany: 'There is the illusion that the New Germany left after the annexations can be reduced to a 'pastoral state'. It cannot be done unless we exterminate or move 25.000.000 out of it'. Hoover had rediscovered the wisdom of the mercantilist population theorists: an industrialised nation has a much larger carrying capacity in terms of population than an agricultural state. The de-industrialisation process had also led to a sharp fall in agricultural yields and partly to an institutional collapse, giving evidence to the importance of the linkages between the industrial and agricultural sector that were also a hallmark of mercantilist economics (See section I, 7 in this paper). Less than four months after Hoover's alarming reports from Germany, the US government announced the Marshall Plan, which aimed to achieve exactly the opposite of the Morgenthau Plan: Germany's industrial capacity was at all cost to be brought back to its 1938 level. It cannot be emphasised enough

128 Reinert, Erik S,, 'Increasing Poverty in a Globalised World: *Marshall Plans* and *Morgenthau Plans* as Mechanisms of Polarisation of World Incomes', in Chang, Ha-Joon (editor), *Rethinking Economic Development*, London, Anthem, 2003.

that the Marshall Plan was not a financial plan, it was a *reindustrialisation plan*.

We shall claim that Morgenthau Plans, after years of neglect, were resurrected by the Washington Consensus starting in the 1980's and, even more strongly, after the end of the Cold War in 1991. De-facto Morgenthau Plans came with the label of 'structural adjustment', which very often had the effect of de-industrialising Third World nations. These two ideal types of economic policy, the Marshall Plan and the Morgenthau Plan, explain the 'virtuous' and 'vicious' circles that were fashionable, but not well explained, in the heyday of development economics during the 1950's and 60's. The crucial role of the nation-state in carrying out the right type of economic policy is discussed in Reinert (1999).

Figure 4. The virtuous circles of Marshall Plans.

Figure 5. The vicious circles of Morgenthau Plans.

3. De-industrialisation and The Vanek-Reinert Effect (winner-killing effect) of free trade.

This effect is an extension both of the classical Heckscher-Ohlin model and of what in standard international trade theory is called the *Rybczynski theorem*, that – in a two-country two-factor model – the output of the commodity using extensively the factor that increases in the economy will expand and the output of the other commodity will contract. 'For instance, when only labour grows, the output of the labour-intensive commodity expands and the output of the capital-intensive commodity contracts. On the other hand, when only capital grows, the output of the capital-intensive commodity expands and the output of the labour-intensive commodity contracts'[129]

The Vanek-Reinert effect predicts that when, following a situation of relative autarky, free trade suddenly opens up between a relatively advanced and a relatively backward nation, *the most advanced and knowledge-intensive industry* in *the least advanced country will tend to die out*. This was the case after the 19th Century unification of Italy and, in the 1990's, the first casualties of free trade were the Czech and Brazilian computer industries. In extreme cases of this Vanek-Reinert effect, nations become nearly completely deindustrialised as was the case of Mongolia in the 1990's.[130] The most advanced nations specialize in capital- and innovation-intensive goods, while the less advanced countries specialize in maquila-type low-technology goods. A frequent effect of this is that free trade destroys more than it contributes in

[129] Chacholiades 1978, p. 343.
[130] See Reinert 2003 and 2004 for a further discussion.

terms of national wealth, we experience cases of ‘destructive destruction’, destruction where no regenerative activities take place.

Trade theorist Jaroslav Vanek (of the Heckscher-Ohlin-Vanek theorem) lectured on this phenomenon as ‘the herbicide effect of international trade’ or ‘destructive trade’, and Reinert has described this as the ‘winner-killing effect’ (Reinert 1980). Under this ‘Vanek-Reinert’ effect, in a free trade regime, each nation reinforces its original comparative advantage, the wealthy First World its comparative advantage in higher skills in increasing returns industries, while the poor nations fall back on their comparative advantage in diminishing return industries. This is what we have previously referred to as ‘Schumpeterian underdevelopment’. A comparative advantage in a diminishing returns activity is a ‘natural advantage’, based on Nature’s bounties, whereas a comparative advantage in an increasing returns activity is a ‘created advantage’, based on Man’s inventiveness and skills. Historically a nation’s transition from having a comparative advantage in resource based diminishing return activities to a comparative advantage in increasing returns knowledge-based activities have required extremely strong policy measures and periods of heavily managed international trade policy.

This perspective is in our view a most important one for National Innovation Systems, because it opens up for nations to specialize in economic activities which have the least possibilities for innovation and growth: activities subject to diminishing returns, activities bereft of any scale effects, dead-end activities left over from long mature paradigms, activities that are virtually unmechanizable at any reasonable cost with present technological knowledge and with cheap labour available, but for which there is still demand. In other word, it opens up for the possibility of nations to specialize in producing goods with a very limited potential for innovation, requiring very low skills, it opens up for specializing in being poor inside the international division of labour.

The problem is that once a gap in skills and wages is established, the market will automatically assign low-skill/low wage activities to the nations who are poor and unskilled. This is the basic logic behind the new global supply chains and maquila-type activities. In our view, this represents a kind of ‘economic gravity’ that makes it particularly difficult to construct National Innovation Systems. This is because the areas where innovations occur will automatically be brought back to the core countries, as the low cost of labour is no longer a necessary competitive factor in this activity.

High market share is no guarantee for wealth. Honduras and Haiti dominate the world market for a manufactured product: Baseballs, produced mainly for the US market. This product illustrates in our view a classical case of Schumpeterian underdevelopment. The world’s most efficient golf ball

producers are located in New Bedford, Massachusetts, and are paid wages of about 12 dollar an hour. The world's most efficient baseball producers are located in Honduras and in Haiti, working 10 hours per day for an hourly wage of about 25 cents. The wage ratio between the two groups of workers, both in the same industry producing balls for sport and both being the most efficient in the world, is about 48 to 1 in nominal terms. This happens in spite of the fact that any person sewing baseballs in the US would *not* be more efficient than the Haitians. These are the 'unequal exchange' effects of Schumpeterian Underdevelopment.

The *characteristics of the product* 'baseballs' itself contains the elements of poverty and underdevelopment. No new skills are developed because there is no *demand* for new skills. No learning-by-doing takes place in Haiti, because there is no learning taking place in baseball production *anywhere.*[131] The Haitians are not working with capital and with machines, because not even all the capital of the United States has managed to mechanize base-ball production. More education in Haiti will lead to migration, because there is no demand for skills. Haiti is locked into poverty[132], specialised in being poor within the international division of labour. And, importantly, there are no market forces in sight that could conceivably change this situation. A mechanisation of baseball production would simply take this industry back to the Unites States, just as the cutting of fabrics were removed from the Central American assembly *maquilas* the moment laser cutting became available. The mercantilists told us that economic growth was *activity-specific* - it happened in some industries and not in others. In our view they were right.

Rapid technological change of the 19th century created what came to be called 'the social question' in Europe, growing economic inequality and increasing misery in the middle of a technological revolution. Among the most miserable were the 'home workers', specializing in the non-mechanised routine economic activities that had not become part of the industrial factory. In our view the *maquila* system raises similar problems: global supply chains filter out the technological dead-ends and farm them out to the Third World. From a cost-reduction point of view this is perfectly logical. However, the result is that old 'inefficient' import substitution industrialisation produced higher real wages in a large number of Latin American countries than the maquila activities do today.[133] These nations specialize in routine activities

[131] Had the poor Haitians not been available, the high cost of sewing would probably have lead to mechanisation of baseball production. The availability of poor workers provides a disincentive for innovations.
[132] See Arthur, Brian, 'Competing technologies, increasing returns and lock-in by historical events', in *Economic Journal*, Vol. 99, 1989. Reinert 1996, 1999, 2000 and 2004 uses the lock-in concept in this context of being locked into poverty. See also Cimoli, Mario, 'Networks, market structure and economic shocks, the structural changes of innovation systems in Latin America', paper presented at the seminar 'The Other Canon in Economics', Oslo, August 2000.
[133] See the paper by Roca and Simabuko for this conference.

where the scope for innovation is minimal[134], an important aspect of the phenomenon we have called 'Schumpeterian underdevelopment'.

The Schumpeterian Quality Index of Economic Activities ranks activities dynamically according to their potential for dynamic imperfect competition. It is our contention that a premature and too rapid globalisation causes a large number of Third World countries to lose the 'high quality' activities and to specialise in 'low quality jobs' like baseball production.

Figure 6. The Quality Index of economic activities.

[134] See also Audretsch, David, 'Diversity: Implications for Income Distribution', forthcoming in Reinert (editor), 2004.

4. De-industrialisation and falling terms of trade.

The development of Terms of Trade is admittedly a complex issue, but it is remarkable that the terms of trade in some small Latin American nations peaked during the period of highest industrial development, in the 1970's. De-industrialisation and falling terms of trade seem to be connected, a phenomenon that can be explained by a combination of two factors. The collapse of trade union power and the loss of industrial employment removed the floor of the labour market, creating falling wages. The pressures of the international commodity markets could then press down both the relative price of the commodity and of national wages. With no alternative employment for the workforce, commodity production could also spread into the areas of diminishing returns, reducing the marginal productivity of labour [135]. A self-reinforcing vicious circle has been created, and can only be stopped by introducing increasing return activities to the nation.

The early 20th century Australian argument for the creation of an industrial sector, albeit not internationally competitive, was an argument for preventing exactly this chain of events to take place. The existence of an alternative labour market in the manufacturing sector would prevent wool production to go into marginal areas by creating a 'wage floor', under which wages would not move, not even in the commodity sector[136].

Figure 7. Peru's Terms of Trade 1950-2000.

5. Product life-cycles and innovation systems.

The product life-cycle theories in international trade created in the late 1960's and early 1970's by Ray Vernon and Louis Wells is in our view extremely relevant for a discussion of the construction of National Innovation Systems in the Third World.[137] These life-cycles are clearly also tied to technological trajectories. We have argued that the understanding of life cycles both of products and of technologies are important factors which must be considered when understanding what we have called 'Schumpeterian Underdevelopment'[138]

[135] Reinert (1980) documents several cases of this.
[136] This is extensively discussed in Reinert (1980).
[137] Vernon, Raymond, 'International Investment and International Trade in the Product Cycle', in *Quarterly Journal of Economics*, Vol. 80, May 1966, pp. 190-207. Wells, Louis, *The Product Life Cycle and International Trade*, Boston, Harvard Business School, 1972. This issue is also extensively discussed in Reinert (1980).
138 Reinert, Erik S, 'The role of technology in the creation of rich and poor nations: Underdevelopment in a Schumpeterian system', in Aldcroft, Derek H. and Ross Catterall (editors), *Rich Nations - Poor Nations. The long run perspective*, Aldershot, Edward Elgar, 1996. Spanish translation 'El rol de la tecnología en la creación de países ricos y pobres: El subdesarrollo en un sistema Schumpeteriano', en Cuadernos, Lima, Peru, Vol. 7, No. 12, 2002.

Poor countries will automatically have a comparative advantage in mature products towards the end of the product life cycle, thus impeding the potential for innovation. This argument is closely related to point 3 above.

6. The perils of the commodity lottery.

Economic historians have recently introduced the term 'commodity lottery' when discussing economic development. We find that this is a useful term, since the characteristics of different commodities will shape national economies in many ways: the 'commodity lottery' will in many ways shape the national economy and determine the potential for cultivating a National Innovation System.

Some natural resources produce linkages to knowledge-intensive sectors more than others. In the early 20th century waterfalls for the production of electricity were perfect examples of these kind of 'enforced linkages': the loss of energy was, at the time, so high per kilometre that the new industrial centres based on electricity had to be built directly under the waterfall. In contrast the smelting of Bolivian zinc was done in England for the longest time. One particularly interesting example is by Cuban social scientist Fernando Ortiz, who – in his book 'Cuban Counterpoint' – shows how sugar brings slavery, ignorance and poverty in the Eastern part of Cuba, whereas tobacco brings private smallholdings, knowledge and welfare in the Western part of the island.[139]

As the students of the Dutch Republic and of Venice of old claimed – and today one might add of Japan and Switzerland – the best draw in the commodity lottery was to have no commodity: this forced the nation directly into a man-made, rather than a nature-based comparative advantage, subject to increasing rather than diminishing returns. Montesquieu notes:

'The barrenness of the earth renders men industrious, sober, inured to hardship, courageous, and fit for war; they are obliged to procure by labor what the earth refuses to bestow spontaneously'[140].

7. Technological change and diminishing returns.

'The fact that there are increasing returns is wonderful news. If something gets better, as it's more used, this is great news; if something gets cheaper the more it is produced, that's wonderful. Diminishing returns made Carlyle call economics a dismal science.
Increasing returns maybe makes economics a cheerful science'

W. Brian Arthur, interview in *Pretext*, May 1998.

[139] This is extensively discussed in Reinert (1996)
[140] *The Spirit of the Laws,* New York, Hafner, 1949, p. 273.

Technological change has been very rapid in agriculture, fishing and mining. This does not, however, mean that diminishing returns are no longer in operation. We find that John Stuart Mill's term 'the flexible wall of diminishing returns' is a useful one. If diminishing returns are reached e.g. in fisheries, there are always a few more fish which can be caught, but at rapidly increasing costs. If the number of animals on the steppe is increased, there is room for more until there is a severe winter. Diminishing returns constitutes 'a highly elastic and extensible band, which is hardly ever so violently stretched that it could not possibly be stretched any more, yet the pressure of which is felt long before the final limit is reached, and felt more severely the nearer that limit is approached.'[141]

We have argued for the perils to welfare and to the environment inherent in a global economy where a large number of nations become de-industrialized without international mobility of labour. [142] These nations will constantly be butting against Mill's 'flexible wall', and as Alfred Marshall pointed out in his *Principles*, the mass migrations of world history have their origin in diminishing returns. This is, in our view, a compelling reason against the de-industrialisation that has taken place in so many countries over the last decade and a half. In Mongolia de-industrialisation and the return to pastoral activities have led to overgrazing. Mongolia was grazing animals at the outer limits of this 'elastic band', and a climatic change that was within the normal range, wiped out between 2 and 3 Million animals during the winter of 2001-2002. This was, however, only a small portion of the total number of animals that had been added to the Mongolian economy as the previously urban industrial and government workers who lost their jobs had had to return to the countryside.[143]

'Mercantilist' industrial policy – from Henry VII in 1485 through Korea in the 1960's – is, in a nutshell, essentially only a dynamic version of an industrial policy which Alfred Marshall recommends in the first edition of his *Principles*: 'A tax ...on the production of goods which obey the Law of Diminishing Returns, and devoting the tax to a bounty on the production of those goods with regard to which the Law of Increasing Returns acts sharply'.[144] In 1923, Frank Graham – a president of the American Economic Association –

[141] Mill, John Stuart (1848), *Principles of Political Economy*, London, p. 177.
[142] Reinert, Erik S. 'Diminishing Returns and Economic Sustainability: The dilemma of resource-based economies under a free trade regime', in Hansen, Stein, Jan Hesselberg and Helge Hveem (Eds.), *International Trade Regulation, National Development Strategies and the Environment: Towards Sustainable Development?*, Oslo, Centre for Development and the Environment, University of Oslo, 1996. Available on www.othercanon.org
[143] Statistics are found in Reinert 2004 (also on www.othercanon.org)
[144] Marshall, Alfred, *Principles of Economics*, London, Macmillan, 1890, p. 452.

repeated this kind of argument, which was recently to become the core of 'New International Trade Theory'.[145]

The following figure shows the fight between technological change and diminishing returns, where diminishing returns get the upper hand.

Figure 8. Ecuador: Diminishing returns and productivity development in the banana industry.

8. Resource depletion and technological retrogression.

Depletion of natural resources coupled with high unemployment frequently cause technological retrogression, a phenomenon that can in some sense be seen as the opposite of a National Innovation System. The mechanisms at work are fairly straightforward: resource depletion causes expensive labour-saving technologies to be no longer profitable, and highly labour-intensive technologies requiring very poorly paid labour take over. This retrogression is strongly tied to the phenomenon of diminishing returns (see above) in combination with a lack of alternative employment opportunities.

In her Ph. D. thesis at the University of Oslo, Sylvi Endresen documented technological retrogression in fisheries in Sri Lanka and India[146]. When fishing resources are depleted, it is no longer profitable to use large ocean-going boats or – in the more severe cases – any boats with outboard engines, so fishing reverts to the traditional labour-intensive methods. The same phenomenon can be observed in mining industries. The miners in Potosi, Bolivia, can be seen working over the slag or refuse from previous processing in order to recuperate leftover minerals. On a recent visit to Tanzania, we could observe that the recent fall in coffee prices seemingly has had a similar 'primitivisation effect' there.

The same phenomenon can of course also happen in industrialized countries, as when the consumption of diesel fuel to fish caught in certain sectors of the Norwegian coast (both measured in kilos) approached 1:1 (one kilo of diesel oil required in order to catch one kilo of fish). The main difference is that in a developed country – where alternative employment possibilities or unemployment benefits exist – such unprofitable activities are simply shut down, they are not – as in the Third World – continued with more primitive technologies.

[145] Graham, Frank, 'Some Aspects of Protection further considered', in *Quarterly Journal of Economics*, Vol. 37, 1923, pp. 199-227.
[146] Endresen, Sylvi, *Technological Retrogression,* University of Oslo, Department of Human Geography, 1995.

9. Techno-economic paradigms: central vs. peripheral effects.

One underresearched aspect of Schumpeterian Development Economics is in our view how new techno-economic paradigms affect the center and periphery differently. Carlota Perez eminently treats their cyclical aspects in terms of income distribution, and also the geographical aspects of financial crises between the core and periphery nations [147]. But in our view there are also other issues that would merit more research, issues that belong to 'Schumpeterian Development Economics'.

Human beings play two different roles in society, as consumers and as producers. When economic activities have different abilities to absorb knowledge, and when innovation in knowledge-intensive activities spread as what we have called triple-layer rent-seeking – to entrepreneurs, workers and the state – it is sometimes possible to trade off Man's role as a consumer with Man's role as a producer. By protecting knowledge-intensive industries a nations' consumers will suffer in the short run, but in the long run their wages will rise (industrial wages are higher than agricultural wages) compared to staying in an agricultural economy. In a second round-effect goods will get cheaper again as the nation moves down the learning curve, and productivity in the agricultural sector will rise as the synergies with the manufacturing sector develop. This was the essential argument for The American System of Manufactures, which lasted in the United States from about 1820 until the end of the century. [148] In the words of Daniel Raymond, a nation could upgrade by getting more skills, just the same way a person could. During eighty years the Americans tried in vain to explain this logic to the English, but towards the end both John Stuart Mill and Alfred Marshall granted them a point.

Nations specialized in the production of paradigm-carrying activities frequently experience different effects than the consuming nations or the nations supplying the raw materials. The cotton-growing states in the United States experienced different effects than the cotton-spinning states, and in fact the friction between these two groups of states – should or should not the North try to industrialize and spin cotton – was an important element leading up to the US Civil War. The increased demand for rubber produced negative welfare effects in the rubber-producing countries. A particularly ugly case – the so-called Putumayo Affair – involving the mistreatment, slavery and brutality towards the Amazon Indian rubber collectors, created a major scandal in England and Europe in 1912-13. The sheer size of the official

[147] Perez, Carlota, *Technological Revolutions and Financial Bubbles. The Dynamics of Bubbles and Golden Ages,* Cheltenham, Edward Elgar, 2002.

[148] The two main authors here are Raymond, Daniel, *Principles of Political Economy*, Baltimore, Fielding Lucas, 1820 & Carey, Mathew, *Essays on Political Economy; or, the most certain means of promoting the wealth, power, resources and happiness of nations: applied particularly to the United States,* Philadelphia, H.C. Carey & I. Lea, 1822. (Note the 'mercantilist' title of this US work, a collection of smaller works totalling about 550 pages.)

English documents on the affair indicates its importance at the time. [149] The North entered a new Fordist techno-economic paradigm, but the effects in the roadless Amazon periphery were mainly negative.

10. Re-enclavisation and the loss of economic diversity.

The *dual economy* was identified by early development economists as being a key characteristic of underdeveloped countries. A modern export sector – an economic enclave – was not integrated in the rest of the economy. With increasing import substitution, industrialisation, and a more diversified industrial sector, this contrast between the 'modern' and 'backward' sectors of the national economy was strongly reduced.

Concomitant with deindustrialisation and falling protection starting in the late 1980's, many small and medium-sized poor nations saw the diversity of their productive sector strongly reduced. They were again moving towards economic monoculture based on the export of raw materials. At the same time the build-down of the state made it more difficult to monitor the (mostly foreign-owned) enclaves. A recent example of this is the large number of Chilean-owned mines in Peru that brings in all their needs – including food and drink – by air from Chile, bypassing any Peruvian customs. In Africa the growth of private armies seen as necessary to protect mining companies is another example of 'retrogression' taking the countries back to conditions that prevailed during the early days of colonialism. Thus many Third World countries are at present losing again developments that were seen as progress starting in the post WW II era.

11. Technology used for de-skilling instead of skill-creation.

This is a phenomenon which takes place in any country – both center and periphery. New technology can be used in order to produce Burger King cashier terminals with symbols which eliminate the need for operators to be able to read and write. Such developments, however, are much more serious in developing countries where the lack of qualified jobs – the often extreme shortage of job possibilities for university graduates – is a serious problem. Not only are these countries producing far away from the production possibility frontiers, perhaps only 20-30 per cent of the economically active

[149] See *Report by His Majesty's Consul at Iquitos on his Tour in the Putumayo District, Presented to both Houses of Parliament by Command of His Majesty,* London, His Majesty's Stationary Office, 1913, The *Index and Digest of Evidence to the Report and Special report from the Select Committee on Putumayo* (London, His Majesty's Stationary Office, 1913) indicates that the total number of pages in the collected reports exceed 13.000. The index itself is 90 pages folio size. There is a numerous bibliography of the events.

have what in the North would be defined as ' job, but innovations may also come in a guise which reduces the numbers of qualified jobs.

In a recent paper Mario Cimoli and Jorge Katz show these 'deskilling' effects in Argentine automotive production as regards engineers.[150] They argue that these developments 'are pushing Latin American economies into a "low development trap" ' The authors also use the term 'lock-in effects' when 'liberalization and globalization of markets in the context of competing forms under increasing returns to scale mechanism can eventually reinforce the technology gap between nations if the 'destruction' of local capabilities is not compensated by technology transfers from globalised firms'[151]. This is one of the lock-in effects into relative poverty that we have referred to in several papers during the 1990's.

12. Increasingly footloose technological change: implications for the periphery.

Geography and distance as economic factors have always worked as factors promoting the spread of production. The importance of geography as an economic factor is compounded with the factor of time: by what Alfred Chandler calls 'economies of speed'. Clearly, their relative isolation compared to the industrial powers of the world gave 19th Century Australia and New Zealand more 'natural protection' to native industry than did the Irish Sea for Irish industry.

Using an idea from German economist Franz Oppenheimer (1864-1943), we can imagine, as a starting point, a world void of the *costs*, *frictions* and *lags* created by geography and time. To this a factor representing these costs, frictions and lags of time and geography in the real world, would have to be added. Oppenheimer calls this factor *Transportwiderstand*, or 'transport resistance'. Although we really intend to say 'resistance caused by time and geography', we shall stick to Oppenheimer's term, even though it sounds clumsier in English than in German. In the example above Australia's location gives the country a higher *transport resistance* than Ireland.

One key feature of technological change during the last century has been the decrease of *transport resistance* – also sometimes called 'the death of distance'. This has clearly made catching up – getting the national economies into increasing return activities – in peripheral countries more difficult. We would argue that the extreme *transport resistance* present in traditional service industries which – including public administration – provide a large

[150] Cimoli, Mario and Jorge Katz, 'Structural reforms, technological gaps and economic development: a Latin American perspective', in *Industrial and Corporate Change*, Vol. 12, No. 2, 2003, pp. 387 ff.
[151] p. 407.

percentage of First World jobs, combined with the non-globalisation of the labour market, together form the main reason why the world does not experience a strong trend towards factor-price equalisation downwards. Only teleporting – as in the science fiction movies – would have totally eliminated *transport resistance,* opening up for international trade in traditional service industries.

A *transport and time resistance* of virtually zero makes protection meaningless in many new industries. At the same time, ideas that could previously be profitably developed within a national innovation system may often have to travel to the parts of the world where the innovative milieu and necessary venture capital can be found. The necessary focusing on core capabilities has made it much more difficult, e.g. in a small country like Norway, to integrate new innovations into an increasingly focused and specialised productive structure. When attending the annual convention of the Association of University Research Parks (AURP) in Madison, Wisconsin a few years ago, I was struck by remarks from representatives from universities in the US Midwest who complained that all the good research ideas left the Mid-West to go either to the East or the West Coast where the industrial *milieus* and the venture capital was located. These forces are clearly at work – even more strongly so – in the Third World. We therefore run the risk that the good ideas produced by a peripheral National Innovation System much easier that before will be sucked into the global economy in the First World. That innovations frequently will take place in the center, although the invention took place in the periphery, is another dimension of Schumpeterian development geography.

13. The National Innovation Systems: from independence to a core-periphery system.

In his study of the Mexican National Innovation System, Mario Cimoli [152] showed that the integration between the Mexican and the US economy had gone from relative independence to a core-periphery relationship between US owners and Mexican subsidiaries. This recalls the center-periphery dependence theories of classical developmental economics.

14. Destructive destruction and Schumpeterian Development Geography.

Creative destruction is an important term in Schumpeterian economics, and we have previously argued that this term entered economics via Friedrich

[152] Cimoli, Mario (editor), *Developing Innovation Systems: Mexico in a Global Context,* London, Thompson Learning, 2000.

Nietzsche and Werner Sombart [153]. As Schumpeter, Nietzsche himself saw this process as a positive one. The eminent Renaissance historian Jacob Burckhardt – Nietzsche's friend and colleague at the University of Basel – was, however, of a different opinion. In his view 'there are (or at any rate there seem to be) absolutely destructive forces under whose hoofs no grass grows'[154] . Destruction and creativity may take place in entirely different parts of the globe, as when the textile mills of Manchester replaced the weavers of Bengal. The fact that the labour market is not globalised in our increasingly globalised economy in our view opens up for this possibility, sometimes with very serious consequences, as in the case of Mongolia.

In our view, the above mechanisms work together creating formidable barriers to National Innovation Systems that not only reduce the price of products from Third World countries, but which also raise the standard of living in the Third World Countries themselves. These 'perverse backwashes' – to use Gunnar Myrdal's term – in no way make the concept of National Innovation Systems less valuable as an analytical tool. They only further what is already emphasized in the NIS literature: that it is extremely important to evaluate National Innovation Systems in their context.

Conclusion: Avoiding National Innovation Systems as Schumpeterian icing on the neo-classical cake.

As a response to mounting evidence of its inefficiency in promoting economic welfare, the Washington Consensus has developed during the 1990's. The sequential development of the Washington policy prescriptions since the early 1990's can roughly be outlined as follows:

'get the prices right'
'get the property rights right',
'get the institutions right',
'get the governance right',
'get the competitiveness right'
'get the national innovation systems right'.

We would suggest that the next step should be 'get the economic activities right', i.e. a diversified structure of increasing returns activities.

It is not clear that these consecutive focal points really have brought us any closer to understanding why economic development by its very nature seems

[153] Reinert, Erik S. 'Creative Destruction in Economics: Nietzsche, Sombart, Schumpeter' (with Hugo Reinert), forthcoming in Backhaus, Jürgen and Wolfgang Drechsler (editors): *Friedrich Nietzsche 1844-2000: Economy and Society*, Series *The European Heritage in Economics and the Social Sciences,* Boston, Kluwer.
[154] Burckhardt 1943.

to be so unevenly distributed. The risk is that we have not arrived at the root causes, synergies, and conditions that make institutions, innovation, and good governance viable and possible. We may be continuously pointing to new symptoms rather than the root causes of development, not including in our analysis the preconditions these phenomena need to take root. For example, institutions that took centuries to develop in an industrialized Europe are not likely to be successfully transferred to a feudal mode of production or to a hunting and gathering tribe. Likewise, as far back as in the 1500's economists like Giovanni Botero were pointing to a diversified artisan and manufacturing base as a precondition both for 'good rule' and for the synergetic process that we call economic development to take place. This would explain why the very existence both of political freedom and generalized welfare was, for so many centuries, an urban phenomenon. A feudal economic structure did not lead to 'good governance'. This would also give us a hint as to why the process of de-industrialisation in the 1990's – in effect removing the complex synergetic diversity and division of labour of a society – actually weakens the nation-states in question.

We argue, then, that by integrating some Schumpeterian variable to mainstream economics we may not arrive at the root causes of development. We risk applying a thin Schumpeterian icing on what is essentially a profoundly neoclassical way of thinking, trade theory is but one example here. In our view it is necessary to investigate deeper into the productive structure, into how the logic of competitive business need to allocate routine tasks and innovative tasks internationally in order to survive, and what the consequences of these business strategies are for the possibilities of creating successful NIS in the Third World. As has already frequently been emphasized in the NIS approach, it is crucial to understand the different national contexts.

Today's problems of income polarization are similar to previous events; in Italy at the time of Serra, in France after the Napoleonic Wars, in the Italian *Risorgimento,* and later in 19th century Europe. Similar ideas, around the activity-specific nature of economic growth, have always surfaced. The mechanisms are similar, but the context and the necessary institutions to be created are different. We argue that 19th century economic policy in the countries that industrialized in the era of English world power built on the old insights. Wilhelm Roscher and Friedrich List – the 19th century economists who (directly or indirectly) put increasing returns back on the theoretical map – both quoted Antonio Serra's work (which had been reprinted in 1803). Following Botero and Serra, Friedrich List made the point that a critical synergetic mass in manufacturing (increasing return) activities is the mother not only of welfare, but also of the kind of civil liberties that are necessary both for individual freedom, the arts, civilization, and democracy to flourish.

According to this view economic growth, innovation systems, good governance, and democracy all depend on the same type of preconditions.

We argue, then, that the present increase of 'failed states' – the 'Somaliasation' of the Third World – ought to be seen in this light: failing states and massive deindustrialisation are phenomena which develop in parallel in many poor Third World countries since the mid-1980's. They are, in our view, integrated parts of the same problem of removing the synergies that created the nation-states in the first place. Because present-day economic theory does not possess the tools to capture these effects, the situation is allowed to deteriorate further.

The world is facing a 'social question' on the world scale, various recent reports – among them from the UNDP – show that anywhere between 60 and 90 nations have grown poorer since 1990. The old 'social question' was only solved by creating institutions that, one by one, became building blocks of a system that produced generalized welfare: minimum wage, health and safety standards, health insurance, unemployment benefits, etc. These institutions were above all constructs of the German *Verein für Sozialpolitik* – the Association for Social Policy – working from 1872 to 1932, which received the political backing of Chancellor Bismarck at an important point. Their institutional innovations created the most important blueprints for solving 'the social question' across Europe. We are now faced with a new and global version of 'the social question', but this time the distributional problems are more *between* nations than *inside* nations. Not only do we need to acknowledge that we are facing a serious problem, we also have to build institutions that fit the new situation. And: we need a Bismarck in the political sphere to see the importance of the issue and carry through the reforms.

With the growth of evolutionary and neo-Schumpeterian economics in the 1990's, focus was again put on the production side of the economy. Evolutionary economics has been the branch of economics that has delved into the 'black box' of technology and production, into Schumpeter's *Güterwelt* – the world of goods and services. Essentially equipped with the right focus on production and innovation, evolutionary economics could, in our opinion, deliver even more to the study of uneven economic growth from the point of view of the Third World. We suggest that there is room for 'Schumpeterian Economic Geography', 'Schumpeterian Trade Theory', and 'Schumpeterian Development Economics'. The link between technology and wages – which was an important issue both for the German Historical School and the 'old' US institutionalists – has, for example, not been central in evolutionary economics.

History shows that the wealthier an economy, the less is the need for government intervention. Or, as Keynes said it: 'The more troublous the

times, the worse does a laissez-faire system work.'[155] The problem is that today's world economic order is working totally to the contrary of this principle: The wealthiest nations have the most active economic policies, both targeting, nurturing and protecting their innovation systems and picking winners, while they also protect their agricultural sectors. We claim that the present form globalisation does not allow laggard nations to catch up, it may lock in the losers into a specialisation in being poor.

For centuries it was accepted common sense that a nation would be much better off with an inefficient manufacturing sector than without any manufacturing sector at all. Today increasing returns are frequently found in advanced services, but these advanced services normally need a manufacturing sector to thrive. History has shown that the synergies and the division of labour arising out of the increasing return sectors – manufacturing and advanced services – are the core mechanisms behind economic growth, innovation systems, good governance and democracy. As happened at the end of the first wave of globalisation – about 100 years ago – this means that we again shall have to revise our attitude towards instant free trade. Although being the long-term goal, free trade is sometimes a counterproductive solution in the short run.

APPENDIX 1

Creating National Innovation Systems & The Generic Developmental State:

Continuity of policy measures and tool kit from England in 1485 (Henry VII) to Korea in the 1960's: a mandatory passage point for economic development.

…the fundamental things apply, as time goes by.
Sam, the pianist, in 'Casablanca'.

1. Observation of wealth synergies clustered around increasing return activities and continuous mechanisation in general. Recognition that 'We are in the wrong business'. Conscious *targeting, support and protection* of these increasing return activities.
2. Temporary monopolies/patents/protection given to targeted activities in a certain geographical area.
3. Recognizing development as a synergetic phenomenon, and consequently the need for a diversified manufacturing sector ('maximizing the division of labour', Serra 1613 + observations of the Dutch Republic and Venice)

[155] The issue was therefore not, said Keynes, one between collectivism and *laissez-faire*, but between targeted state action and a socialism which was out of date and contrary to human nature. Quoted in Skidelsky, Vol. I, p. 152.

4. Attraction of foreigners to work in these activities (historically religious prosecutions have been important)
5. Relative suppression of landed nobility (from Henry VII to Korea). (Physiocracy as a rebellion against this policy)
6. Tax breaks for targeted activities.
7. Cheap credits for targeted activities.
8. Export bounties for targeted activities.
9. Strong support for agricultural sector, in spite of this sector clearly being seen as incapable of independently bringing the nation out of poverty.
10. Emphasis on learning/education (UK apprentice system Elizabeth I)
11. Patent protection for valuable knowledge (Venice from 1490's)
12. Frequent export tax/export ban on raw materials in order to make raw materials more expensive to competing nations (starting with Henry VII in late 1400's, whose policy was very efficient in severely damaging the woolen industry in Medici Florence).

APPENDIX II.[156]

Two different ways of understanding the economic world & the wealth and poverty of nations.

STARTING POINT FOR THE STANDARD CANON:	**STARTING POINT FOR 'THE OTHER CANON':**
Equilibrium under *perfect information* and *perfect foresight*	Learning and decision-making under uncertainty (Schumpeter, Keynes, Shackle)
High level of abstraction	Level of abstraction chosen according to problem to be resolved
Man's wit and will absent	Moving force: *Geist- und Willenskapital:* Man's wit and will, entrepreneurship
Not able to handle *novelty* as an endogenous phenomenon	*Novelty* as a central moving force
Moving force: 'capital per se	Moving force: New knowledge

[156] Authors: Erik Reinert, Leonardo Burlamaqui, Ha-Joon Chang, Michael Chu, Peter Evans, and Jan Kregel.

propels the capitalist engine'	which creates a demand for capital to be provided from the financial sector
Metaphors from the realm of physics	Metaphors (carefully) from the realm of biology
Mode of understanding: Mechanistic ('begreifen')	Mode of understanding: Qualitative ('verstehen'), a type of understanding irreducible only to numbers and symbols
Matter	*Geist* precedes matter
Focused on *Man the Consumer* A. Smith: 'Men are animals which have learned to barter'	Focused on *Man the Innovator and Producer.* A. Lincoln: 'Men are animals which not only work, but innovate'
Focused on static/comparative static	Focused on change
Not cumulative/history absent	Cumulative causations/'history matters'/backwash effects (Myrdal, Kaldor, Schumpeter, German Historical School)
Increasing returns to scale and its absence a non-essential feature	Increasing returns and its absence essential to explaining differences in income between firms, regions and nations (Kaldor)
Very precise ('would rather be accurately wrong than approximately correct')	Aiming at relevance over precision, recognizes the *trade-off between relevance and precision* as a core issue in the profession
'Perfect competition' (commodity competition/price competition) as an ideal situation = a goal for society	Innovation- and knowledge-driven Schumpeterian competition as both engine of progress and ideal situation. With perfect competition, with equilibrium and no innovation, capital becomes worthless (Schumpeter, Hayek)

The market as a mechanism for setting prices	The market also as an arena for rivalry and as a mechanism selecting between different products and different solutions. (Schumpeter, Nelson & Winter)
Equality Assumption I: No diversity	Diversity as a key factor (Schumpeter, Shackle)
Equality Assumption II: All economic activities are *alike* and *of equal quality* as carriers of economic growth and welfare	Growth and welfare are *activity-specific* – different economic activities present widely different potentials for absorbing new knowledge
Both theory and policy recommendations tend to be *independent of context* (’one medicine cures all’)	Both theory and policy recommendations highly *context dependent*
The economy largely independent from society	The economy as firmly embedded in society
Technology as a *free good*, as ’manna from heaven’	Knowledge and technology are *produced*, have cost and are protected. This production is based on incentives of the system, including law, institutions and policies
Equilibrating forces at the core of the system and of the theory	Cumulative forces are more important than equilibrating ones, and should therefore be at the core of the system
Economics as *Harmonielehre*: The economy as a self-regulating system seeking equilibrium and harmony	Economics as an inherently unstable and conflict-rich discipline. Achieving stability is based on Man’s policy measures (Carey, Polanyi, Weber, Keynes)
Postulates the representative firm	No ’representative firm’. All firms are unique (Penrose)

Static optimum. Perfect rationality	Dynamic optimization under uncertainty. Bounded rationality
No distinction made between real economy and financial economy	Conflicts between real economy and financial economy are normal and must be regulated (Minsky, Keynes)
Saving caused by refraining from consumption and a cause of growth	Saving largely results from profits (Schumpeter) and saving *per se* is not useful or desirable for growth (Keynes)

Appendix III.

The Family Tree of the Other Canon.

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