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**Recent trends in economic
theory – implications for
development geography**

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'About a year ago I more or less suddenly realised that I have spent my whole professional life as an international economist thinking and writing about economic geography, without being aware of it.'

Paul Krugman, Professor at MIT, leading US economist.¹

1. Introduction

Development geography and mainstream economic theory have for many years lived separate lives. Especially so since the downfall of development economics, an academic subject which has repeatedly been pronounced dead by one of today's leading US economists.² The geographical dimension - the location of production in space - has completely disappeared from neo-classical economic theory. This is, in one sense, curious, because the 'founding father' of neo-classical economic theory - the Englishman Alfred Marshall - is still an important figure also in economic geography through his *industrial districts*. We shall return to 'the two Marshalls' later in this paper. Another vintage economist used in modern economic geography, Alfred Weber, with his Location Theory (Standorttheorie)³, belongs to a school of economics which virtually died out: The Historical School, of German origin.

However, economic theory is itself changing rapidly at the moment - and interestingly one of the new developments is that the ideas of the German Historical School are coming back into economic theory. In contrast to modern economic theory, in the holistic Historical School of economics, both time (history) and place (geography) play a natural part⁴. In this paper we shall analyse the recent main trends in economic theory, and attempt to assess the implications of these changes for development geography. Especially, we shall discuss the possibilities for a process of convergence between the discipline of development geography and parts of economic theory.

In economic theory there are three main developments which we find are of potential importance to development geography: **First** of all, the mainstream neo-classical paradigm is being challenged from a growing school under the heading of 'Evolutionary' or 'Schumpeterian' economics, with roots in the German Historical School. This group is gaining prominence within the OECD and the EU. **Secondly**,

¹ In: *Geography and Trade*, Louvain University Press, Louvain, Belgium and MIT Press Cambridge Massachusetts; London, England, 1991, p. 1.

² Krugman, Paul, 'Toward a Counter-Counterrevolution in Development Theory', in *Proceedings of the World Bank Annual Conference on Development Economics 1992*, Washington DC, World Bank, 1993, p. 15.

³ Weber, Alfred, 'Industrielle Standortlehre. Allgemeine und kapitalistische Theorie des Standortes', in: *Grundriss der Sozialökonomie*, Tübingen, J.C.B. Mohr, 1914. Volume VI, pp. 54-22.

⁴ The part geography played in German economic theory is expressed in the monumental *Grundriss der Nationalökonomie*, edited by Max Weber and Joseph Schumpeter among others, in the article 'Die geographische Bedingungen der menschlichen Wirtschaft', by Alfred Hettner, in Volume II, pp. 1-31, Tübingen, J.C.B. Mohr, 1914.

from inside the neo-classical school, a 'new growth theory' is evolving. It is not clear whether this new theory will reform the neo-classical paradigm from within, or whether it indirectly attacks the very foundations of the neo-classical system in such a way that in the long run it may bring down the whole neo-classical framework. The **third** development, perhaps the one with the most immediate implications for development geography, is the change which has taken place in international trade theory over the last 10-12 years.

Before treating these three developments in separate chapters, we shall look at the background and timing of the changes presently taking place in economic theory.

'I foresee that within the next ten or twenty years the now fashionable highly abstract analysis of conventional economists will lose out. Though its logical base is weak - it is founded on utterly unrealistic, poorly scrutinised, and rarely even explicitly stated assumptions - its decline will mainly be an outcome of the tremendous changes which, with crushing weight, are falling upon us.'

Gunnar Myrdal, 1976.⁵

2. Counter-factual assumptions - how neo-classical economics 'lost' the causes of uneven growth

From the point of view of a geographer, historian, or business theorist, economic theory has worked at a very high level of abstraction. The mathematical accuracy of neo-classical economics has been achieved at the cost of 'assuming away' factors which to other disciplines were crucial variables. To many development economists - Gunnar Myrdal being a prime example⁶ - the irrelevant basic assumptions of neo-classical theory are at the core of the problems of the Third World. The most important of these assumptions are 'perfect information', 'constant returns to scale', and 'full divisibility of all factors'. These assumptions form the very foundations of the theoretical structure we call neo-classical economic theory.

The three core assumptions describe the necessary conditions for perfect competition. The assumptions are not there because they reflect observations of the real world. They are merely there to keep the theoretical structure intact. The time factor disappeared from neo-classical economic theory some time in the 1930's, and present theory assumes instant adjustments in the economic system. An unintended by-product of this set of assumptions, is that *all economic activities become alike*. A shoe-shine boy in Quito, Ecuador and IBM both become 'representative firms'. All variables which make these two firms differ are each and every one assumed not to exist. The mathematical accuracy of neo-classical economics is achieved at the cost of assuming away all factors which cause a geographically uneven distribution of economic growth. From the point of view of explaining uneven growth, the accuracy of neo-classical economic theory is achieved at the cost of irrelevance. Schumpeter described this trade-off between accuracy and relevance very well: 'The general reader will have to make up his mind, whether he wants *simple* answers to his questions or *useful* ones - in...economic matters he cannot have both'.⁷ Neo-classical economics opted for simple and accurate answers, at the cost of neglecting the factors which cause both uneven growth and, and to large extent, growth itself.

⁵*The Meaning and Validity of Institutional Economics*, in Dopfer, K. (Ed.) *Economics in the Future*, London, Macmillan.

⁶ See e.g. his *Development and Underdevelopment. A Note on the Mechanism of National and International Economic Inequality*, Cairo, National Bank of Egypt, 1956, pp. 11-15.

⁷ Schumpeter in the introduction to Zeuthen, F, *Problems of Monopoly and Welfare*, London, Routledge, 1930, p. x (10).

There is a total neglect of the problem of uneven development in neo-classical economics. The theory of which economists normally have been most proud - international trade theory - shows decisively that with increasing international trade we shall all be equally rich. Paul Samuelson 'proved' with two articles in 1949 and 1950 that under the usual assumptions of neo-classical economic theory, everybody would be equally rich with more international trade. *Under the assumptions*, no doubt Samuelson is correct. The problem is, however, that by assuming away increasing returns to scale, diminishing returns, and imperfect competition, the main factors causing uneven development have been excluded from his analysis.

Excluding the key factors which skew income distribution has a long history in economics. The roots of the problem lie already in Adam Smith's treatment of the process of economic growth. Smith describes the division of labour - which is crucial to modern society - but he refuses to go into the organisational changes which necessarily follow. Adam Smith is committed to the study of the *individual*, and totally neglects the organisational changes which follow as the natural result of his celebrated division of labour.⁸ Smith accurately observes that the division of labour '*so far as it can be introduced*, occasions, in every art, a proportionable increase of the productive powers of labour'⁹. On the same page he observes that the textile industry allows many divisions of labour, whereas agriculture does not. If division of labour causes wealth, can we understand from this that industry is more likely to cause national wealth than agriculture? Later in book one, on the single occasion Adam Smith uses the term 'an invisible hand'¹⁰, he argues for the protection of national industry. On the other hand, only agriculture was 'natural' to him. There are observations in the *Wealth of Nations* - an embryo of a theory - that economic activities are different because they allow for different degrees of division of labour. However, these observations are completely lost in the main thrust of his work: A celebration of the 'natural order' of things. To Smith, industry produces the organisations and institutions which he so abhors because they invariably distort 'the natural course of things'. Adam Smith has no theory of organisation, seemingly because he deeply distrusted all human institutions.

There is a profound contradiction in Adam Smith: The source of wealth, to him the division of labour, is also the source of large scale organisations which he so despised. Without a division of labour, there is little reason why firms should exist at all. If markets are perfect, why do we need firms? Clearly because of the division of labour among men. The difference in size and power of firms is then also a result of larger or smaller divisions of labour. To this very day, economic theory has no 'theory of the firm', a fact which is observed with increasing uneasiness in the profession.

Neo-classical economic thought carries on Smith's tradition of neglecting the organisational consequences of economic development - all economic activities become alike. Since the early 17th Century, one factor has been described as being

⁸ Adam Smith's deficiency as a student of human organisations is very well pointed out in McCraw, Thomas, 'The Trouble with Adam Smith', in *American Scholar*, Vol. 61, No. 3, Summer 1992, pp. 353- 373.

⁹ *Wealth of Nations* (1776), Chicago, University of Chicago Press, 1976, p. 9. Our italics.

¹⁰ *ibid.*, p. 477.

important in making some activities better than others as carriers of economic growth: *increasing returns to scale*, or, as the phenomenon is called in business theory; *economies of scale*. **Increasing returns to scale** is the one factor which is common to the three changes in economic theory which we are looking at in this paper: Evolutionary/Schumpeterian, new growth theory, and new trade theory.

The importance of this factor was long recognised in economic theory, until it was forced out of economic theory due to the mathematisation - modelled on physics - which took place towards the end of the 19th century. As far back as in 1613 Antonio Serra noted that one nation could grow richer than others by specialising in activities where costs decreased in a less than proportionate way as the volume of production increased - a phenomenon he indicated was largely limited to industry¹¹. To Antonio Serra the unprecedented wealth of the Republic of Venice was to a large extent to be attributed to increasing returns. Adam Smith does not mention this phenomenon, although scale effects follow naturally as a consequence of his praised division of labour - or rather their effects are what make a division of labour more profitable and 'competitive' than previous forms of production. Economies of scale were central to the 19th Century theories of economic growth which lead - protected by high tariffs - to the industrialisation of the United States, Germany and other European nations, and Japan. The founder of neo-classical economics, Alfred Marshall, in the early editions of his celebrated *Principles of Economics*¹², clearly recognised that a nation could improve its position by subsidising economic activities subject to increasing returns, and tax those subject to diminishing returns (e.g. agriculture).

During the last decades of the 19th Century, economic theory was formalised to the model of the physics science of that period.¹³ *Increasing returns to scale*, which up until then had played an important role in economic policy-making, were not compatible with the concept of *economic equilibrium* which came to form the centrepiece of the new theory. The gradual disappearance of *increasing returns* can be studied over the 8 editions of Marshall's *Principles*¹⁴, as economic theory moved towards mathematisation in the style of late 19th Century physics, and the theory acquired its essential features which are still retained today. There are in a sense two Marshalls, the early Marshall who thoroughly understands industry and to whom 'the Mecca of the Economist lies in Economic Biology', and the later Marshall who is remembered for the mechanical principles in the appendices of his *Principles*.¹⁵ The later Marshall won the day, and during this transition economic theory 'lost' the factors which cause uneven geographic development.

¹¹ Serra, Antonio, *Breve Trattato delle Cause che possono far abbondare li Regni d'Oro e Argento dove non sono miniere. Con applicazione al Regno de Napoli*, Naples, Lazzaro Scorriglio, 1613.

¹² Marshall, Alfred, *Principles of Economics*, London, Macmillan, 1890 (1st edition). p. 452.

¹³ This extremely interesting account is found in Mirowski, Philip, *More Heat than Light. Economics as Social Physics, Physics as Nature's Economics*, Cambridge, Cambridge University Press, 1989, and in De Marchi, Neil (editor) *Non-Natural Science: Reflecting of the Enterprise of 'More Heat than Light'*, Durham, Duke University Press, 1993.

¹⁴ These changes can be studied in the Ninth (Variorum) Editions, 2 Volumes, London, Macmillan for the Royal Economic Society, 1961.

¹⁵ For an account of this, see Niman, Neil B. 'Biological Analogies in Marshall's Work', in *Journal of the History of Economic Thought*, Vol. 13, No. 1, Spring 1991, pp. 19-36.

Later, some economists insisted on the importance of *increasing returns* in explaining both economic growth as such (Young 1928¹⁶), and - working in conjunction with diminishing returns - in explaining international maldistribution of income (Graham 1923¹⁷). However, these very important insights were disregarded by the majority of the economics profession for one simple reason: The existence of *increasing* and *diminishing* returns was not compatible with what had come to be the core credo of economics: general equilibrium.¹⁸

¹⁶ Young, Arthur, 'Increasing Returns and Economic Progress', in *Economic Journal*, Vol. 38 , pp. 527-542.

¹⁷ Graham, Frank, 'Some Aspects of Protection Further Considered', in *Quarterly Journal of Economics*, Vol. 37, pp. 199-227.

¹⁸ A typical example showing this line of argument is found with Jacob Viner, the main trade theorist of the period, in his *Studies in the Theory of International Trade*, New York, Harper, 1937, pp. 475-482.

3. Economic theory - why a radical change now?

The main body of economic theory has lived with irrelevant assumptions for 100 years. A few economists have protested - the most famous ones being Joan Robinson, Nicholas Kaldor, and Wassily Leontief. Although they criticised the assumptions of economic theory, development economists surprisingly did not pick up the issue of increasing and diminishing returns. Myrdalian vicious and virtuous circles could easily be explained by their existence. Reinert (1980¹⁹) shows the extent and importance of diminishing returns in the main export products of Bolivia, Ecuador, and Peru. However, when the issue of scale economics returned to economic theory later in the 1980's, only the variant of importance to the industrialized world - increasing returns - was resurrected. Diminishing returns in real life are - despite their importance in the Third World - still not a part of the economics debate.

Why have these protests been ignored for so many years, and now suddenly are taken seriously? As usual in economic theory, there is a demand side and a supply side answer also to this question. To a nation engaged in activities with 'historical increasing returns' - technical change and increasing returns - excluding scale effects will not harm economic performance - to the contrary, the country will greatly benefit from a world trading system where scale effects are ignored. The diminishing 'competitiveness' of the United States in world trade in the late 1970's - especially *vis a vis* Japan - lead to a demand for theories which could provide an explanation for this. The American public now demanded the relevance which Myrdal had demanded decades earlier. Myrdal's prophesies quoted above came true. The key economist in the resurrection of *increasing returns*, Paul Krugman, emphasises the importance of *new economic tools* as the key factor for the changes. His colleague Joseph Stiglitz stresses what in our opinion is the most important source of the change: It was the demand for new and different ideas that was crucial.²⁰

After the fall of the US from the summit of world economic power, a new generation of US economists was forced to re-examine the basic assumptions of neo-classical theory. They succeeded in developing mathematical tools to handle the problem of increasing returns to scale. In doing this, these economists unintendedly again introduced the issues of spatial income distribution, thereby reopening possibilities of communication between economics and geography.

The new demand lead to a perusal of these assumptions, and also to the rediscovery of geography. As Paul Krugman puts it: 'The neglect of spatial issues in economics arises for the most part from one simple problem: how to think about market structure. Essentially, to say anything useful or interesting about the location of economic activity in space, it is necessary to get away from the constant-returns, perfect-competition approach that still dominates most economic analysis. As long as

¹⁹Reinert, Erik, *International Trade and the Economic Mechanisms of Underdevelopment*, Ann Arbor, University Microfilms, 1980.

²⁰ Stiglitz, Joseph, 'Comment on "Toward a Counter-Counterrevolution in Development Theory"', by Krugman', in *Proceedings of the World Bank Annual Conference on Development Economics*, Washington DC, World Bank, 1993, p. 42.

economists lacked the analytical tools to think rigorously about increasing returns and imperfect competition, the study of economic geography was condemned to lie outside the mainstream of the profession. Indeed, as standards of rigor in economics have risen over time, the study of location has been pushed further and further into the intellectual periphery'.

When Krugman refers to the lack of analytical tools, he intends the mathematical toolbox of neo-classical economics. The importance of increasing and diminishing returns to the spatial distribution of wealth was clearly shown by Graham in his 1923 article, using numerical examples.

4. Trend 1: The evolutionary challenge to neo-classical economics

The evolutionary or Schumpeterian school of economics is based on the writings of the Austrian Harvard economist Joseph Alois Schumpeter. In a Schumpeterian system, the world is driven forward by technical change and innovations. These changes and innovations break down the existing structures of production in a process which Schumpeter dubbed 'schöpferische Zerstörung' or *creative destruction*. This dynamic world view contrasts sharply with the neo-classical model of the world economy, in which the central feature is the static equilibrium of supply and demand. Table 1 shows a comparison between evolutionary and neo-classical economics.

Schumpeter's world view is extremely different from that of today's Anglo-Saxon mainstream economics, but his views are much less original in the context of the German Historical School of economics. Of Schumpeter's many books and articles, the central piece which contained the seeds of most of his later work was first published in German in 1912,²¹ and in English as *The Theory of Economic Development*²² in 1932. Schumpeter's view on the dynamic role of technology has much in common with Marx', a similarity Schumpeter readily admitted to.²³

The key book resurrecting Schumpeterian economics is Nelson and Winter's *An Evolutionary Theory of Economic Change*²⁴ from 1982. Lately Schumpeterian and evolutionary economics have been used by the OECD in analysing economic growth in the so-called TEP-programme (Technology and Economy)²⁵. Evolutionary economics, with its emphasize on technical change and innovation as the factors creating economic growth, opens up a widely different arena for public policy than neo-classical economics does. In the neo-classical paradigm fiscal and financial policies are virtually the only variables of government policy.

Schumpeterian economics has from its beginnings - starting with the master himself - been focused on the side of the 'winners' in the system - those 'inhabiting the top floor of the first class hotels'. The Schumpeterian School has emphasised the *creative* side of the creative destruction, not the destructive side. In our view Schumpeterian economics can - and should - also be used in explaining the more destructive sides of the world economic system. It is not clear that all Schumpeterian destructions are equally creative. It is not clear that the creation and the destruction - although related - take place in the same geographical area. (Indian indigo producers and German producers of synthetic dyes). The technological 'frontier' where creative destruction takes place, moves ahead very unevenly across industries, creating the

²¹*Theorie der wirtschaftlichen Entwicklung*, Leipzig, Dunker & Humblot, 1912.

²² Cambridge, Mass., Harvard University Press.

²³See e.g. 'Preface to the Japanese Edition of *Theorie der wirtschaftlichen Entwicklung*', in Clemence, Richard V.(editor) *Essays of J.A. Schumpeter*, Cambridge, Mass., Addison-Wesley, 1951, 160-161.

²⁴Richard Nelson and Sidney Winter, Cambridge, Mass., Harvard University Press, 1982.

²⁵The main report is *Technology and the Economy. The Key Relationships*, Paris, OECD, 1992.

opportunity for backwardness caused by technological lock-in effects, to occur (being an efficient stone-age producer in the bronze age).

Table 1. Neo-classical and Evolutionary Economics - a brief comparison

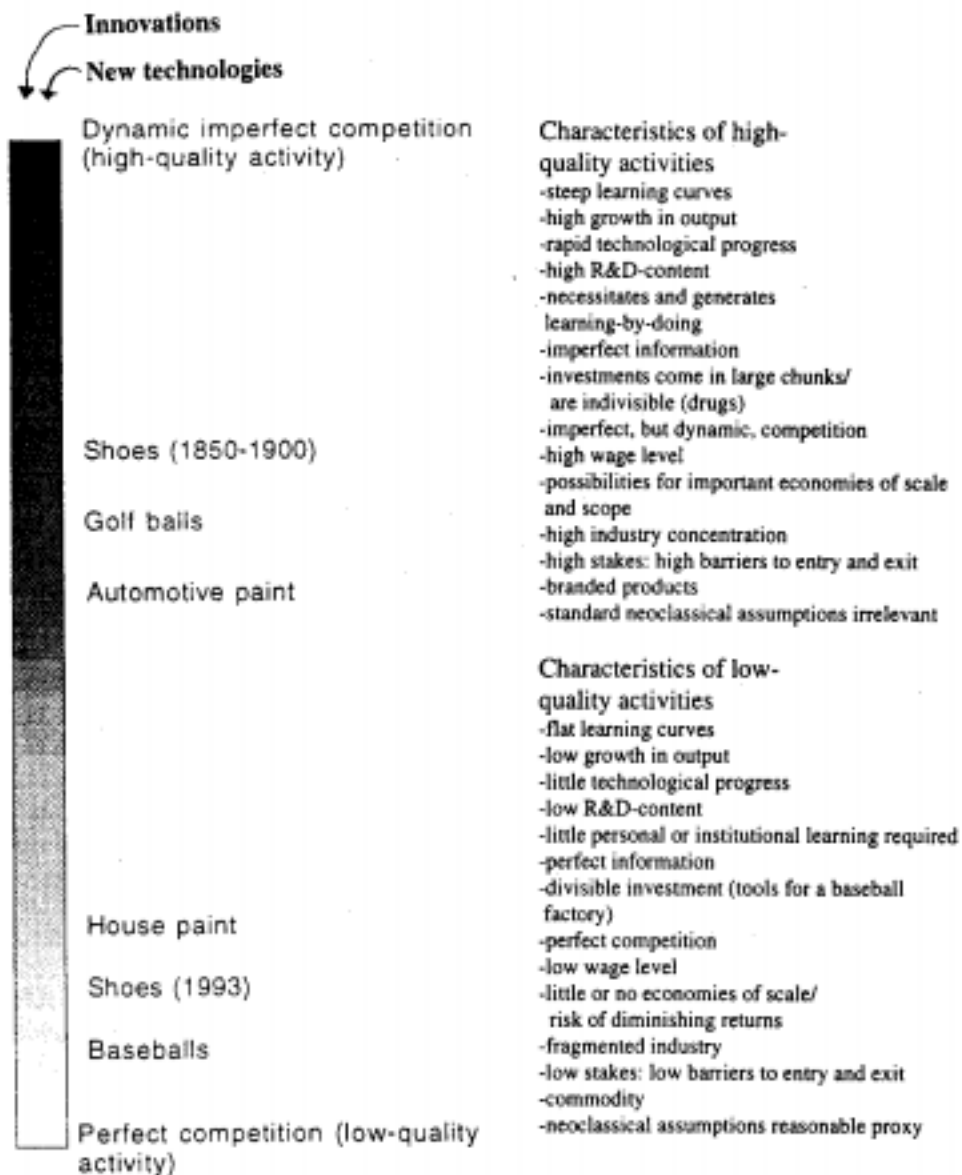
NEO-CLASSICAL THEORY	EVOLUTIONARY THEORY
USE OF PHYSICAL METAPHORS	USE OF BIOLOGICAL METAPHORS
'EQUILIBRIUM' AS A CENTRAL CONCEPT	EMPHASIS ON FACTORS CAUSING DISEQUILIBRIUM
STATIC/COMPARATIVE STATICS	DYNAMIC
HIGH DEGREE OF PRECISION	LESS PRECISE, OPEN FOR NON-QUANTIFIABLE FACTORS
ASSUMES PERFECT INFORMATION	SYSTEM OPERATES UNDER UNCERTAINTY
TIME NOT AN ISSUE	TIME AS IMPORTANT FACTOR 'HISTORY MATTERS'
ENTREPRENEURSHIP UNIMPORTANT	ENTREPRENEURSHIP CENTRAL FACTOR
'ALL ECONOMIC ACTIVITIES ARE EQUAL' (POTATO CHIPS, WOOD CHIPS AND COMPUTER CHIPS)	ECONOMIC ACTIVITIES ARE DIFFERENT BECAUSE INNOVATION 'FOCUSES' AT ANY POINT IN TIME
POSTULATES THE REPRESENTATIVE FIRM'	'THE REPRESENTATIVE FIRM' DOES NOT EXIST
THE MARKET AS PRICE SETTER	THE MARKET ALSO AS SELECTION MECHANISM AMONG FIRMS
TECHNOLOGY AS A FREE GOOD 'MANNA FROM HEAVEN'	TECHNOLOGY AS AN IMPORTANT FACTOR IN WEALTH CREATION AND DISTRIBUTION
THE MARKET IS ALWAYS RIGHT'/ LAISSEZ-FAIRE	OPENS FOR A MORE ACTIVE ECONOMIC POLICY

Diminishing returns to natural resources in the Third World are to some extent being counteracted by technological change - but what is the end effect on national income? In Schumpeterian economics all economic activities are qualitatively not alike from the point of view of creating wealth and poverty.

If economic activities are not 'alike', then how do they differ? To any entrepreneur his business - product and/or location, service, personnel or clientele - is unique. The real world gives us hundreds of millions of different firms; economic theory, for all practical purposes, tells us they are all alike. How can we find an intermediate level of abstraction, one where economic activities can be ranked according to their importance to what we measure as economic growth? In Table 2 we attempt to construct an index where economic activities may be ranked according to their potential of contributing to economic growth. The 'high quality' activities are those which give nations 'competitiveness': activities which enable nations to raise their national wage level and still be able to sell their products on the international market. Underlying the index is that the activities with a high score collect an 'industry rent' which is distributed between capital, labour, and national governments. A core mechanism for capital allocation in market societies is that risk capital is attracted to the activities with a high rate of technical change and a high rate of innovations - those with a high score on the quality index. The imperfect competition which exists at the top level of the quality index - showing the characteristics which are listed - attracts necessary risk capital, but the benefits accrued from being in these activities is also divided with labour, and ultimately with the nation through the creation of a higher tax base.

The main export activities of developing countries achieve a low score on the quality index. They consist of raw materials or mature industrial products. In the production of raw material - due to more perfectly working markets - technical change tends to be taken out as lowered prices, and not as higher wages. Mature industries, like the production of base-balls with a needle and thread technology, are farmed out to the poor countries through the working of the market. Such activities become labour intensive, in the sense that low labour cost becomes the most critical factor of production.

The Schumpeterian system - exemplified in the Quality Index of Economic Activities - presents development geographers with a theoretical framework in which the study of uneven economic growth can be placed. This set of theories could serve as a unifying theory to the many case studies in the field of development geography. They offer an alternative theoretical 'peg' on which case studies may be appended.

Table 2. The Quality Index of Economic Activities²⁶

²⁶ Source: Reinert, Erik 'Catching-up from Way Behind - a Third World Perspective on First World History', in Fagerberg, Jan et. al. (editors), *Catching up, Forging Ahead, and Falling Behind. On the Dynamics of Technology, Trade, and Growth*, London, Edward Elgar, forthcoming 1994.

5. Trend 2: ‘New Economic Growth Theory’

5.1 The ‘residual’ and the origins of doubt

From being a theory where economic growth was caused merely by the addition of more capital to each unit of labour, economic growth theory has, over the last 4 decades, moved on to take account also of other factors. The origin of this change lies in the so-called ‘residual debate’ in the late 1950’s, associated with Moses Abramowitz and Robert Solow. In his 1957 paper ‘Technological Change and the Aggregate Production Function’²⁷, Solow compares a model based on the standard aggregate production function to the actual figures in the US economy.²⁸ His surprising result is that only 12,5% of economic growth in the period studied can be attributed to the increase of labour and capital. A ‘residual’ of 87,5% of overall growth has to be explained by some other factor. Solow therefore introduces a third factor labelled ‘technical change’.

A year earlier Moses Abramowitz had published a paper with a slightly different methodology. He obtained similar results: only a small part of the growth in the national income could be explained by the growth of the traditional production factors labour and capital. The remainder - the huge ‘residual’ - was to Abramowitz impossible to explain by traditional economic theory. He saw the size of the residual as ‘a measure of our ignorance about the causes of economic growth.’²⁹

Both Solow and Abramowitz pointed out that in order to explain economic growth, a new and third factor had to be included in the traditional neo-classical production function: The concept of technology. But a consequence of doing this is to question a fundamental condition in all neo-classical theory: the condition of no increasing returns to scale.

Anyone who has opened an introductory text in economics will remember that the idea of supply and demand being equal is at the core of economic theory. A French physicist turned economist, Leon Walras, showed towards the end of the 19th Century, by mathematical deduction, that in economic equilibrium free competition was what later came to be called ‘Pareto optimal’: Any deviation from the situation of free competition - i.e. general equilibrium - would lead to a welfare loss. Challenging the notion of constant returns on an aggregate level therefore not only threatens the ‘scientificness’ of the economic science, but also the ideological basis

²⁷Robert Solow, ‘Technical Change and the Aggregate Production Function’, in *Review of Economics and Statistics*, August 1957.

²⁸ The aggregate production function sees the amount of produced goods in a society as a function of the total amount of labour and capital in society. An increase of the total production (measured by GDP) in a society must therefore be explained by an increase of the amount of capital or labour (or both) in production. This means that if one can measure the increase of labour and capital during a period, it should be possible to calculate growth of GDP fairly accurately.

²⁹ Moses Abramowitz, ‘Resource and Output Trends in the United States since 1870’, in *American Economic Review, Papers and Proceedings*, May 1956.

of today's world economic system. Liberating economic theory from the strait jacket of constant returns also opens up for explaining uneven growth.

5.2 Saving the model - achieving perfect competition *and* increasing returns

Technology was clearly a factor which differed from those hitherto employed in neo-classical theory: Labour and capital. A 1962 article by Kenneth Arrow discusses *information* as a commodity, and his analysis can be extended also to be valid for the *commodity* technology³⁰. Arrow shows that unlike traditional commodities such as labour and goods, information has some special qualities: a) Once produced it is difficult to shield from others, and b) There is often no cost associated with sharing information with others. Knowledge - and in many instances technology - can be labelled as a public good.

This basic insight from Arrow was used by the founder of what is now called the new neo-classical growth theory, Paul Romer³¹, when discussing technological change and increasing returns. Romer sets up two sets of dichotomies: First he distinguishes between what he calls *rival* and *nonrival* goods, with *nonrival* meaning that 'it can be used simultaneously by arbitrarily many different firms and people'. The use of a car is *rival* -using the knowledge to produce a new fishing hook is *nonrival*. To Romer, 'a nonrival input has a high cost of producing the first unit and a zero cost of producing subsequent units'. Romer explicitly mentions inputs like production design, which can also be extended to mean technology. The second dichotomy established by Romer is *excludability* and *nonexcludability*. Excludability is: 'if someone with a property right can exclude others from taking advantage of it'. As an example, a car is rival and excludable, computer software is excludable (by copy protection) but nonrival because the same knowledge is being used by subsequent users. If a good is nonrival, it produces what Romer calls *nonconvexity*: If the input of rival goods which are used in the production process are doubled, then the production doubles. But, the nonrival product technology does not have to be doubled in order to achieve this. The nonrival input can (by definition) be used again, in this model virtually cost free.

Technology, being a nonrival factor of production, does not have to be doubled in order to double production. This effect will produce increasing returns, since doubling of output does not depend on doubling of all the inputs (only on doubling of capital and labour). US mathematician Paul Romer - in his Ph.D. dissertation from 1983 - managed to introduce technology into economic theory again, bringing growth back into the mainstream of economic debate. In this way technology was introduced as a major factor of growth, but the assumption of perfect information and the general equilibrium were saved. Romer has elegantly included the technology variable, but by making technology a public good he continues to exclude all economic factors which cause uneven development.

³⁰Arrow, Kenneth, 'Economic Welfare and the Allocation of Resources for Invention', in *The Rate and Direction of Inventive Activity*, Princeton University Press 1962.

³¹Romer, Paul, 'Are Nonconvexities Important for Understanding Growth', in *American Economic Review, Papers and Proceedings*, May 1990.

The new growth models treat technical change as an *endogenous* - or internal - factor. Solow's model of aggregate growth includes a factor representing technical change over time. This helps Solow fit the model to his data, but many economists have found his approach rather unsatisfactory. It looks like technical change is *exogenous* - as if it were generated outside the economic system itself. Romer, and other writers in the new neo-classical growth tradition, have shown how this change can itself be generated as a product of economic activity.

A 1986 article by Romer³² is mainly concerned with the question of externalities and increasing returns. Romer distinguishes between two different forms of knowledge: specific knowledge for the firm, and the general level of knowledge in society. This general level of knowledge in society equals the sum of the knowledge of individual companies. This means that if one company increases its level of knowledge, the general level of knowledge in society increases. Clearly Romer here maintains the assumption of perfect information, which in the end would mean that all human beings know exactly the same. Other companies will gain from the production of knowledge in a firm, implying that knowledge production has externality effects. Following the excludability and rivalry discussions above, the growth of an economy is determined by the growth of knowledge. Romer has elegantly made increasing returns and externalities compatible with 'competitive equilibrium'.

One interesting aspect is that Romer shows how market forces by themselves do not necessarily lead to optimal welfare. His model shows that government action may produce positive welfare effects. To each individual firm the most profitable strategy may be to use existing knowledge. On the other hand, knowledge produced in individual firms will spill over to rest of society, thereby increasing economic growth and welfare. This has, of course, long been recognised outside the circles of neo-classical economists.

5.3 Opening up for uneven growth

In 1988 Robert Lucas, Jr. published an article entitled 'On the Mechanics of Economic Development'³³. Here he attempts the task of 'constructing a neo-classical theory of growth and international trade that is consistent with some of the main features of economic development.'. His main concern with neo-classical economics is 'its apparent inability to account for observed diversity across countries, and its strong and counterfactual prediction that international trade should induce rapid movement towards equality in capital-labour ratios and factor prices.' By introducing accumulation of human capital (learning) which is constant independently of the level of achieved knowledge (no diminishing return on knowledge production), Lucas is able to make a much more realistic model of the economy. In his model the production of knowledge takes place either as a result of intentional practice or as a by-product of other activities. ('learning by doing'). The fact that knowledge can be produced in activities not intended directly for knowledge production, was pointed out by Kenneth Arrow in 1962³⁴. In Lucas' model, if a

³²Romer, Paul, 'Increasing Returns and Long-Run Growth', *Journal of Political Economy*, 1986

³³Lucas, Robert Jr. 'On the Mechanics of Economic Development', in *Journal of Monetary Economics*, Vol. 22 pp. 3-42

³⁴Arrow, Kenneth, 'The Economic Implications of Learning by Doing', in *Review of Economic Studies*, Vol. 29, pp. 155-173.

country has a large part of production that generates 'learning by doing', this country will achieve a higher growth because of the higher accumulation of knowledge. As opposed to Romer, Lucas opens up new growth theory for the study of uneven development.

The general conclusions of the most realistic models in new neo-classical growth theory are twofold: 1) that there is a role for a government industrial policy, and 2) that, following Lucas, countries with different initial conditions can face two different paths of development depending on the initial conditions. These models can produce a general equalisation of the growth levels of the rich countries - there will be a catching-up of the least rich of the rich toward the richest. Among the poorest countries there will be convergence where the poorest countries will be lagging more and more behind - a polarisation of the world in two groups, the have's and the have not's.

6. Trend 3: Trade and geography - the return of increasing returns

Forcing the issue slightly, the history of economic thought can be divided into three periods: the *Age of Discovery* (from the beginnings of the science in the 16th Century until the 1890's), the *Age of Formalisation* (1870-1980's), and the *Age of Rediscovery* (starting in the 1980's). In the Age of Rediscovery economists are putting back into economic theory important factors - described and used for economic policy centuries ago - which were excluded from economic theory during the period of mathematisation based on nineteenth century physics. As a result, economic theory is lowered several notches in terms of level of abstraction. Consequently, it also reopens for including the factors which cause uneven growth.

The key factor being put back into trade theory is, again, increasing returns, and the key person in the process of rediscovery is MIT's Paul Krugman. Krugman correctly observes that economic theory has followed the perceived line of least mathematical resistance³⁵. He claims that the reason scale effects were excluded was that the profession was unable to express these mathematically. Starting in 1979 Krugman published a series of articles introducing increasing returns in international trade theory. His 1979 and 1980 articles³⁶ model a world where an initial discrepancy in capital-labour ratio exists between two countries or groups of countries. A period of increasing international trade follows, where only the industrial sector works under increasing returns to scale. The result of this is a world divided into two groups, a rich industrialized center and a poor underdeveloped periphery. In these papers, Krugman refers to Myrdal, Frank, Baran, Wallerstein and even Lenin.

This breakthrough in international trade theory was the result of using models originating in the study of imperfectly competitive markets in the field of industrial economics. Krugman inadvertently opened a Pandora's box, where international markets no longer are fully competitive, and where countries may grow poorer in the presence of free trade than under autarky. Paradoxically, the wave of Reaganomics free market policies, which hit the developing countries in the early 1980's, coincided with the first proof of neo-classical trade theorists that government intervention really *could* improve the free trade situation of a poor country.³⁷ Krugman's conclusions are no more precise than were Marshall's in 1890: that a country can be better off subsidising its increasing return activities and taxing those under diminishing returns. However, Krugman does not refer to this. His history of increasing returns starts with Graham's 1923 article, and he has no mention of the long history of increasing returns - going back to 1613 - as a cause of imperfect competition and consequently as a factor determining economic policy, especially the support and protection of national industry.

³⁵ Krugman, Paul, *Rethinking International Trade*, Cambridge, Mass., MIT-Press, 1990, p. 4.

³⁶ reproduced in *Rethinking International Trade*.

³⁷ A collection of papers on this subject is in Grossman, Gene (editor) *Imperfect Competition and International Trade*, Cambridge, Mass., MIT Press, 1992.

One important problem is that the existence of increasing returns provides an argument both for free trade and protection. When commodities are traded at the same 'level' or 'degree' of increasing returns, the new theory is an argument for more free trade. When trading is between nations producing goods at different degrees of scale effects, the benefits of international trade accrue more, or in some cases exclusively, to the nation producing with the highest degree of economies of scale. In a dynamic framework, when goods produced at increasing returns are sold in exchange for goods produced with diminishing returns, it can be shown, as Graham did in 1923, that the country producing at diminishing returns will actually grow poorer with trade than under autarky. We can compare these cases with what the dependency school referred to as 'symmetrical' and 'asymmetrical' dependency.

The understanding we express here differs crucially from Krugman's. Krugman's mental scheme seems to operate with broadly based sectors, containing homogenous activities from the point of view of scale effects. His conclusion is therefore that what he calls intraindustry trade - trading inside the same product groups, trading cars for cars - is necessarily mutually beneficial to both trading countries. Krugman's approach, using homogenous sectors, excludes the possibility that within the same sector or industry only *some* economic activities are subject to increasing returns. The very same differences he assumes *between* economic sectors, also exist *within* sectors, industries, and even within companies. Within the industry producing balls for sports, the most efficient golf ball producers live in the industrialized countries and make about 10 dollars hourly, while the world's most efficient baseball producers make 30 US cents an hour in Haiti. Both the US golf ball producers and the Haitian baseball producers are the most efficient in the world, given the present state of technology. The difference between the two industries is that golf balls are produced with increasing returns to scale and high barriers to entry, whereas the baseball producing industry operates under conditions of nearly constant returns to scale and low barriers to entry (needle and thread technology).

Krugman's distinguished career 'has been ...confined geographically to the Northeast corridor' (of the United States)³⁸. His imaginative models have extended to 'a clever paper on interstellar trade, where goods are transported from one stellar system to another at speeds close to that of light; the resulting relativistic correction to time entails different interest rates in different frames of reference.'³⁹ The problem in today's economic theory is that writing a model of a phenomenon proves next to nothing. Any good graduate student in economics can write a model showing his pet theory. The problem lies in verifying the models, and decide which ones contain elements which point at important relationships in the real world. After siding with the dependency school, and with Lenin, in his 1979 and 1980 articles, Krugman has been sitting on the lid of the Pandora's box he opened. In his latest book⁴⁰ - aimed at a wider audience than his other book - Krugman's trade theory is again reduced to Ricardo's static gains from 1817. The new insights are - inexplicably in our opinion - lost. The 1979 and 1980 articles, which in our view provided very important insights into the structure of North-South trade, have been relegated to the same level as the

³⁸ Dixit, Avinash, 'In Honor of Paul Krugman: Winner of the John Bates Clark Medal', in *Journal of Economic Perspectives*, Vol. 7, No. 2, Spring 1993, p. 173.

³⁹ *ibid.*, p. 173.

⁴⁰ *Peddling Prosperity*, New York, Norton, 1994.

interstellar paper - a clever use of mathematics with no practical consequences. Krugman's emphasis has been on the existence of increasing returns as an argument for *more* free trade, which is the case with 'symmetrical' relationships. This may, of course, be because he is afraid that the scale argument may be used to reinforce the already strong protectionist sentiments in his own country. The fact that neither Krugman nor his colleagues use actual economic data from either industrial countries or from the Third World to verify their models, effectively blocks his important insights from being used in economic policy.

It may also seem as if Krugman sees scale effects for poorer countries only in a framework of *the infant industry or infant nation argument*. His treatment of Canada - a rare case of historical examples in Krugman's work, illustrates this point. Krugman seemingly accepts the argument that the historical lag and smaller scale of the Canadian economy warranted protection: 'it seems reasonable to argue that Canada's nationalistic economic policies were the key factor in creating this (industrial) strength'⁴¹. Krugman goes out of his way to show that the Canadian case - the only empirical case he uses - is different to that of other periphery nations. His argument is that since the US and Canada in the period in question were competing for immigrants, 'they could do something that similar policies elsewhere cannot: by protecting the domestic market, they could also extend it.' We have two problems with this argument: First of all, it is difficult to understand why it only applies to Canada and the US, and not all the other nations which at the same time were 'competing' for immigrants: Australia, New Zealand, Argentina and many others. Secondly, there are more ways to expand markets than by encouraging immigration. Increasing per capita production and consumption by entering into activities exhibiting Schumpeterian 'historical' increasing returns, or achieving the winning combination of learning by doing and imperfect information, can be done equally well with a fixed population.

The core of 19th Century protectionism is exactly what Krugman points out: By protecting the national market for national industries the market was extended, because the increasing returns which accrued to new industries more than outweighed the initial increase in price caused by the protection. A higher initial price for industrial goods was traded off for an even higher increase in real wages and profits in the protecting nation⁴² - a phenomenon which is inexplicable without the existence of imperfect competition and/or increasing returns.

A thorough understanding of the scale argument leads to the possibility of recommending a lasting protection of certain industries, especially if the alternative free trade leads into lock-in effects in natural resource based industries which by their very nature lead into production with diminishing returns. This is the core of the Australian strategy historically. As already mentioned, Krugman has only resurrected *half* of Frank Graham's 1923 paper, the part dealing with increasing returns, which is the part of interest to the US today. Graham also showed how production under diminishing returns would lead to underdevelopment, implicitly also if the industrial country only produced under constant returns to scale. An example of how the effect

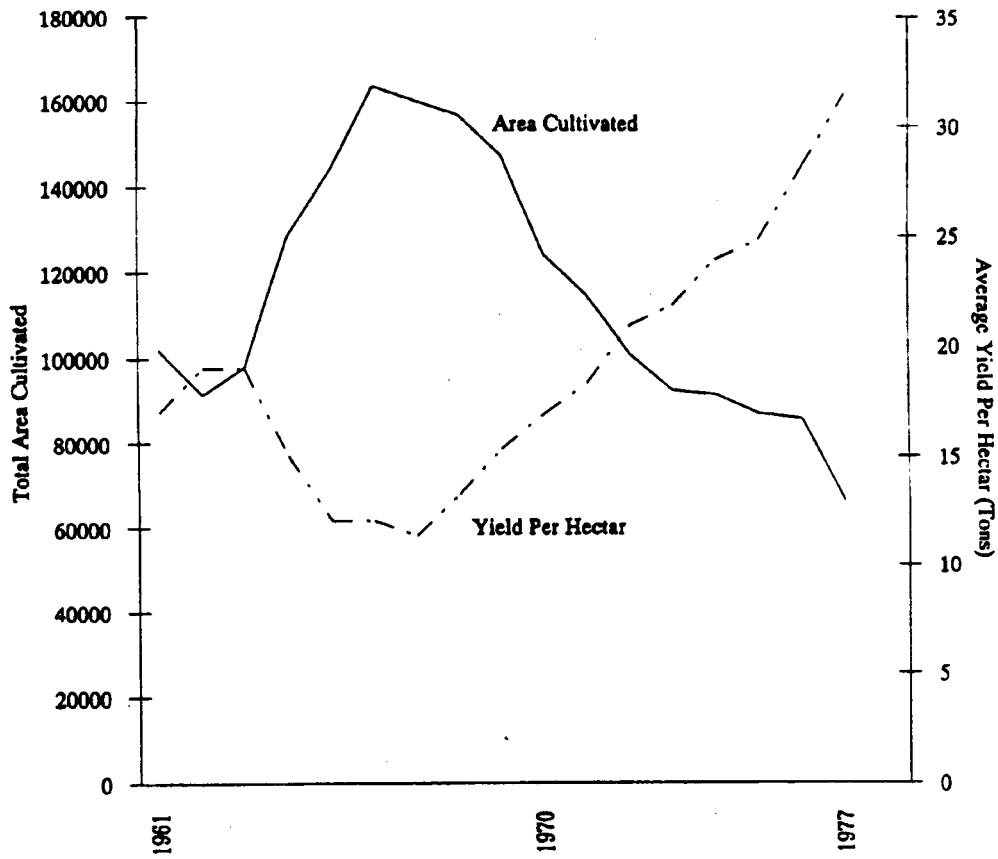
⁴¹ *Geography and Trade*, p. 92.

⁴² For a discussion of this, see Reinert, Erik, 'Competitiveness and its Predecessors - a 500-year Cross-National Perspective', Oslo, STEP-Group, STEP-Report No. 3, 1994, pp. 11-12.

of diminishing returns contributes to underdevelopment - the case of banana production in Ecuador - is shown in Chart 1.

Chart 1.

**Ecuador, Banana Production, 1961-1977:
Area Cultivated and Yield Per Hectar**



7. Conclusion -towards a *rapprochement* between economics and development geography.

Development geography has, since the heyday of development economics in the 1950's and 60's, lived in a world with relatively little theoretical development on the macro-level. One may say that the field of development geography has suffered from a *case-study syndrome* - many case studies and little unifying theory. The need is clearly there to tie the case-studies together with theories on a higher level of abstraction.

The field of economics, on the other hand, has until recently disregarded - assumed as non-existent - all the factors which cause differences in economic growth. As described in this paper, the recent revival of interest in the process of economic growth is about to free economic theory from its most restrictive assumptions. This process has brought new theoretical insights in 3 broad areas: Schumpeterian Economics, New Neo-classical Growth Theory, and New Trade Theory. The use of the new insights from these areas is, to a surprising degree, only confined to the OECD countries. While the OECD-countries apply the new knowledge on how imperfect markets distribute growth in favour of certain industries, the Second (ex-communist) and Third World are being treated to a 'restructuring' exercise which leaves the majority of them largely de-industrialized and considerably poorer than they were when the process started. The exceptions to this are the South-East Asian countries which pick up the 'cascade' of maturing industrial products which successively are farmed out for production from the industrial growth engines of Japan, Taiwan, and Korea.

Today the only area where neo-classical economics is used exclusively as a basis for economic policy is in the Third World. The ignorance in the IMF and in the World Bank of the insights used by the OECD and the EU is, in our opinion, a case of what Myrdal used to call 'opportunistic ignorance.' The challenge for development geography as a profession is in our view to apply the new knowledge generated about the First World growth processes for use in the Second and Third World.⁴³ Case-studies from developing countries and comparisons of First and Third World historical experiences, analysed in the perspectives of Schumpeterian economics, could prove exceedingly useful in furthering the understanding of underdevelopment. Development policy would take a radically new turn if only the insights used by the OECD were to be integrated into the policies of the World Bank and the IMF - the last fortresses of applied neo-classical economics.

⁴³ An attempt at this is Reinert, Erik 'Catching-up from Way Behind - a Third World Perspective on First World History', in Fagerberg, Jan et. al. (editors), *Catching up, Forging Ahead, and Falling Behind. On the Dynamics of Technology, Trade, and Growth*, London, Edward Elgar, forthcoming 1994.

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STEP-gruppen ble etablert i 1991 for å forsyne beslutningstakere med forskning knyttet til alle sider ved innovasjon og teknologisk endring, med særlig vekt på forholdet mellom innovasjon, økonomisk vekst og de samfunnsmessige omgivelser. Basis for gruppens arbeid er erkjennelsen av at utviklingen innen vitenskap og teknologi er fundamental for økonomisk vekst. Det gjenstår likevel mange uløste problemer omkring hvordan prosessen med vitenskapelig og teknologisk endring forløper, og hvordan denne prosessen får samfunnsmessige og økonomiske konsekvenser. Forståelse av denne prosessen er av stor betydning for utformingen og iverksettelsen av forsknings-, teknologi- og innovasjonspolitikken. Forskningen i STEP-gruppen er derfor sentrert omkring historiske, økonomiske, sosiologiske og organisatoriske spørsmål som er relevante for de brede feltene innovasjonspolitik og økonomisk vekst.

The STEP-group was established in 1991 to support policy-makers with research on all aspects of innovation and technological change, with particular emphasis on the relationships between innovation, economic growth and the social context. The basis of the group's work is the recognition that science, technology and innovation are fundamental to economic growth; yet there remain many unresolved problems about how the processes of scientific and technological change actually occur, and about how they have social and economic impacts. Resolving such problems is central to the formation and implementation of science, technology and innovation policy. The research of the STEP group centres on historical, economic, social and organisational issues relevant for broad fields of innovation policy and economic growth.