Economic Development – Less Destruction than Creation

by Andreas Pyka[♣] and Pier-Paolo Saviotti[♠]

[♣] University of Hohenheim, Economics Institute, Wollgrasweg 23, D-70599 Stuttgart, Germany, E-Mail: a.pyka@uni-hohenheim.de

[♠] INRA-GAEL, Université Pierre Mendès-France, BP 47, 38040 Grenoble, France, E-Mail: pier-paolo.saviotti@wanadoo.fr

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Abstract

We apply our model of economic growth by the emergence of new industries to explore the interplay of two concepts by Joseph A. Schumpeter, namely creation and destruction. Although *creative destruction* is probably the best known concept of Schumpeter, it can be meaningfully applied to growth theory only by invoking Pasinetti's ideas on structural change.

Introduction

To start, we have to clarify what exactly is meant by *creative destruction*: Creation is introduced by innovations which provide consumers with increased welfare, producers with profits and contribute to economic growth. Yet such process of creation is inevitably accompanied by the destruction of parts of the existing order. Beyond this general representation on which most scholars probably agree, providing a more accurate interpretation of creative destruction is problematic. We identify at least four different meanings of the concept:

i. Substitution of pre-existing goods/services/technologies with newer ones of higher quality.
ii. Gradual maturation of incumbent sectors by (a) falling labour intensity, (b) falling rate of growth of demand, and (c) gradually increasing competencies/skills and wages as a consequence of the rising product quality within mature sectors.
iii. Growing competition from emerging countries which acquire the capabilities to make the same goods and services as in highly developed countries but at lower costs.
iv. The changing income distribution amongst different social groups and countries depending on their ability to create and exploit innovations. Thus, following the industrial revolution some countries remained behind and became underdeveloped by not being able to access and to exploit emerging technologies.

Meanings iii) and iv) were probably not intended by Schumpeter but have attained great significance in the present situation characterized by an off-shoring of production and sometimes even research & development activities. In this paper we will not discuss meanings iii) and iv) (see Saviotti and Pyka 2011a, 2011b), as we will focus on the impact of the balance between the emergence of new sectors and the increasing product quality and differentiation within incumbent sectors.

What is the state of the art in the discussion of creative destruction in neoclassical new growth theory? Two of the best known endogenous growth models, those of Romer (1990) and of Aghion and Howitt (1992) clearly differ with respect to the role played by creative destruction. In particular, in Romer's model R&D activities create new types of capital goods which accumulate in the economy, thus contributing to economic growth and raising output variety. In Aghion and Howitt's model R&D activities create capital goods of higher quality which replace the incumbent's capital goods of lower quality. Thus, Romer focuses exclusively on the emergence of new products while Aghion and Howitt focus exclusively on product quality and substitution.

By comparing the two models the following two observations impose themselves:

i. The two models choose either growing product variety (Romer) or growing product quality (Aghion and Howitt) as the main factor contributing to economic growth. Even a cursory observation of the real processes of growth, which occurred in capitalist countries during the 20th century, shows that many new sectors were created and that within these sectors product quality, represented by

the services supplied by the products (Saviotti and Metcalfe 1984) and product diversification increased substantially. Thus, real economic development was not constituted only by the emergence of new sectors or only by increasing product quality within incumbent sectors, but by a combination of the two. Consequently, the two models tell us only a part of the story.

ii. There is growing evidence that both the overall variety of the economic system and the product quality within existing sectors have been growing during the process of economic development starting from the 20th century. In the literature considerable empirical evidence is provided that economic systems tend to become more and more differentiated during the process of economic development (Funke and Ruwhedhel 2001a, 2001b, Imbs and Warcziag 2003, Hummels and Klenow 2005, Acemoglu and Zilibotti 1997, Saviotti and Frenken 2008). In this sense the model by Aghion and Howitt, which predicts constant output variety, is empirically inaccurate.

If we accept the evidence that the growing differentiation and output variety of economic systems is an important trajectory in economic development, then the concept of creative destruction cannot be reduced to the substitution of older goods and services by newer and higher quality ones. While the substitution process is a necessary and observed component of economic development, it cannot explain the growing output variety of economic systems. It follows that in economic evolution there is *more creation than destruction*.

To analyze the outlined effects of creative destruction we describe in section 3 our TEVECON model of economic development by the creation of new sectors (Saviotti and Pyka 2004a). This model takes into account both the emergence of new sectors and the growing product quality and differentiation within existing sectors. However, before we proceed to the model, we need to work out fully the implications of the above considerations for the concept of creative destruction; this is done in section 2. In section 4 we analyze numerical experiments that describe different paths of economic development, from which we draw conclusions in section 5.

Innovation, Structural Change and Creative Destruction

Amongst the factors and trends which are responsible for economic development in the long run, growing efficiency of productive processes always stood out in the literature. Efficiency needs to be defined as the ratio of the outputs to the inputs used in a given process.

However, to measure efficiency is by no means an easy task. In economic development we observe both, the emergence of new sectors and the increasing quality and differentiation within sectors. Thus, the value of the outputs of different sectors is in principle subject to two influences: (i) the growing efficiency of productive processes tends to reduce costs, and thus prices of the same output; (ii) the growing product quality and differentiation tends to raise prices and to widen their range. The combined effect of these two trends leads to the observed time path. This means, to measure productive efficiency in time we would need to keep output artificially homogenous, an extremely difficult task, because product quality keeps continuously changing. Clearly,

efficiency growth is not the only long term trajectory in economic development but accompanied by quality improvements and product differentiation. Furthermore, new goods and services, qualitatively different from the pre-existing ones, are introduced into the economic system when new sectors are created. The new sectors typically do not substitute the pre-existing ones but tend to be added to the economic system. Thus, we can expect the variety (or diversity) of the economic system to increase in time.

The need for a combination of the two processes of *increasing efficiency* and of *emergence of new sectors* can be understood starting from the work of Pasinetti (1981 and 1993). According to Pasinetti an economic system at constant composition with a fixed number of sectors would run into a bottleneck due to the imbalance between continuously growing efficiency and saturating demand. This imbalance would allow all demanded output to be produced with a declining proportion of labour and of the other productive resources. Such a bottleneck, which from now on we will call *Pasinetti's trap*, could be avoided by means of innovations which give rise to new sectors and compensate for the growing inability of incumbent sectors to generate employment.

Irrespective of whether one agrees with Pasinetti, the imbalance between continuously growing efficiency and saturating demand represents a different meaning of creative destruction. If not compensated by the emergence of new sectors this imbalance would bring the economic system to a halt. In this case, growing productive efficiency entails a destruction which can be compensated only by the creative emergence of new sectors.

It has to be noted that Pasinetti's reasoning is based on an extension of Engel's law, which in Pasinetti's interpretation amounts to assume that during the evolution of a sector, demand initially rises and then reaches a maximum value, which subsequently remains unchanged. In what follows, we call this assumption *complete saturation*. Furthermore, Pasinetti identified the emergence of new sectors as the only possible escape route from his development trap. We will relax both of these assumptions and test to what extent such relaxation changes the meaning of creative destruction and the expected economic development paths.

Recently constructed empirical Engel curves (Chai and Moneta, 2008) do not seem to provide evidence of complete saturation. At best they show that the rate of growth of demand slows down after the initial fast growth in the evolution of the sector. In a previous paper of ours (Saviotti and Pyka, 2009) we calculated Engel curves for the different sectors of our economic system and showed that complete saturation occurs only in an economic system at constant composition with a fixed number of sectors and in which the demand curves of different sectors are independent of one another. Thus, it seems as if Pasinetti's assumption of complete saturation was too strict.

Most growth models, including the endogenous growth ones, rely on *Say's Law*. In line with Pasinetti we argue that the evolution of demand is a necessary component of the overall growth process. The influence of demand is at least threefold: (i) no innovation can have an impact on economic growth if nobody purchased it. This means that consumers and users need to have sufficiently high incomes; (ii) the relative dynamics of demand and of process efficiency have an important impact on the process of

economic development. In a number of cases demand for a given good or service tends to saturate as income grows. Even when this does not happen, it is still generally true that the rate of growth of consumption rises more slowly than income per capita; (iii) the role of demand is not separable from that of supply. In an innovative economy search activities affect demand, which in turn affects future search activities and thus demand in the following periods. This situation can be adequately described as the co-evolution of demand, innovation and supply.

The TEVECON Model of Economic Development

In our TEVECON model (for a detailed formal description see Pyka and Saviotti 2011) each sector is generated by an important innovation. Such innovation creates a potential market and gives rise to what we call an *adjustment gap*. The term adjustment gap refers to the fact that, when a potential market is created, it is in fact empty: neither the productive capacity nor the demand for the innovation is present. As the new sector matures the adjustment gap tends to fall: a productive capacity which in the end matches demand is created. When this happens the sector enters its saturation phase. The productive capacity is generated by Schumpeterian entrepreneurs establishing new firms initially induced by the expectation of a temporary monopoly. The success of the innovation gives rise to a band wagon of imitators. The number of firms in the new sector gradually rises, but this also raises the intensity of competition, thus gradually reducing the inducement to further entry. When the intensity of competition in the new sector reaches levels comparable to those of established sectors the new sector is no longer innovating but becomes part of the circular flow. When a sector achieves

maturity in the way described above, an inducement exists for Schumpeterian entrepreneurs to set up a new niche, which can eventually give rise to the emergence of a new industry. In other words, the declining economic potential of maturing sectors induces the creation of newer and more promising ones. Competition plays a very important role in this process of creation of new industries.

An additional contribution is made to the dynamics of our artificial economic system by inter-sector competition. Inter-sector competition arises when two sectors produce comparable services. Inter-sector competition is an important component of contestable markets (Baumol et al. 1982) and can keep the overall intensity of competition of the economic system high even when each sector achieves very high levels of industrial concentration.

In our model the degree of variety in the economic system plays an essential role. Economic variety is approximated by the number of different sectors. By increasing variety, the creation of new sectors provides the mechanism whereby economic development can keep occurring in the long run. In this way the economic system can escape the trap generated by the imbalance between rising productivity and saturating demand which would occur in a system at constant composition. This also affects the macroeconomic employment situation: In particular, this artificial economic system can keep generating employment even when employment creation is falling within each sector (Saviotti and Pyka, 2004b).

In order to illustrate the developments generated by our model figure 1a shows the development of the number of firms in certain industries. Within a wide range of conditions the number of firms in each sector grows initially, reaches a maximum and then falls to low values. Within these conditions each sector seems to follow a life cycle, similar to the ones detected by e.g. Klepper (1996) and Utterback and Suarez (1993). However, in our model this industry life cycle is created by variables very different from those used by the previous authors who refer to increasing returns to R&D, radical innovations or the emergence of dominant designs. In our case the cyclical behaviour is caused only by the combined dynamics of competition and of demand. Figure 1b displays the development of the intensity of competition and one clearly sees the impact of intra-industry dynamics as well as the additional effect of inter-sector-competition after the emergence of new sectors.

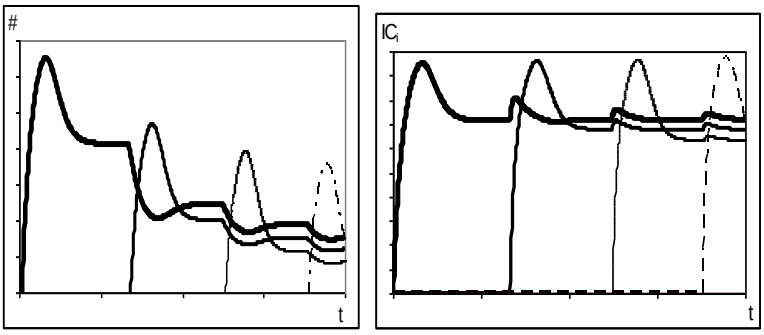


fig. 1a) Number of firms fig. 1b) Intensity of competition

In the following paragraphs we describe briefly the main formal aspects of our model. The main equation governing the dynamics of each sector in the model is:

$$dN_i^t = k_1 \cdot FA_i^t \cdot AG_i^t - IC_i^t - MA_i^t \qquad (1)$$

where dN_i^t is the change in the number of firms in sector *i* at time *t*, AG_i^t is the adjustment gap at time *t*, IC_i^t is the intensity of competition at time *t*, and MA_i^t is the number of mergers and acquisitions at time *t*. Equation (1) represents the rates of entry $(FA_i^t \cdot AG_i^t)$ and exit (IC_i^t, MA_i^t) into and out of sector *i*. Thus, dN_i^t is the net entry of firms in sector *i* at time *t*.

The exit term IC_i^t includes inter- and intra-industry competition (for a detailed description see Saviotti and Pyka 2008). The second exit term MA_i^t includes besides exits via mergers and acquisitions also failure and bankruptcy (see Saviotti, Pyka, Krafft 2007).

$$AG_i^t = D^t{}_{\max i} - D_i^t \qquad (2)$$

The adjustment gap AG_i^t (fig 2c) is large right after the creation of the sector, and later it decreases gradually, although not at all times. It is in fact possible for the adjustment gap to grow during certain periods if innovations following the one creating the sector improve either the performance of the product or the efficiency with which it is produced, or both. In our model search activities affect both the maximum possible demand $(D^t_{max,i})$ and the instant demand (D^t_i) in a sector *i*. If we consider that analytically the adjustment gap (equation 2) is defined as the difference between these two types of demand, we understand that the time path of the adjustment gap depends on those of $D^t_{max,i}$ (fig 2b) and of D^t_i (fig 2a). During particular periods it is possible for $D^t_{max,i}$ to grow more rapidly than D^t_i, thus enlarging the adjustment gap, or delaying the

saturation of the market. In the long run we expect the adjustment gap to be reduced, i.e. the market to become saturated.

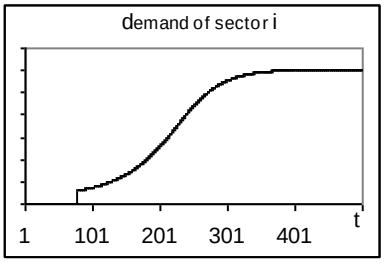


fig. 2a) Demand

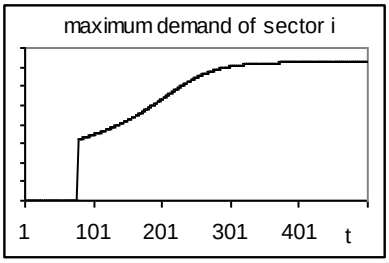


fig. 2b) Maximum demand

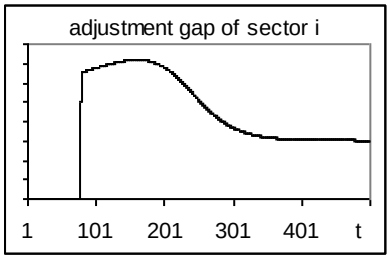


fig. 2c) Adjustment gap

FA_i^t represents financial availability, the amount of money present in the economic system that financial institutions are prepared to allocate to sector *i* at time *t.* Thus, FA_i^t depends on the total volume of money as well as on the presence of financial institutions capable of judging the prospects of growth and development of sector i at time *t.* It is in principle possible for an economic system to have enough money but to lack the financial institutions capable of assessing the potential of a new sector. Co-evolution of the technology of sector *i* and of FA_i^t occurs when FA_i^t grows with AG_i^t and AG_i^t grows with FA_i^t (see Saviotti and Pyka 2009).

Starting from the behaviour of microeconomic variables we can also calculate the curves for aggregate variables. Fig. 3 shows the time path of aggregate employment, obtained by aggregating the employment curves of individual sectors.

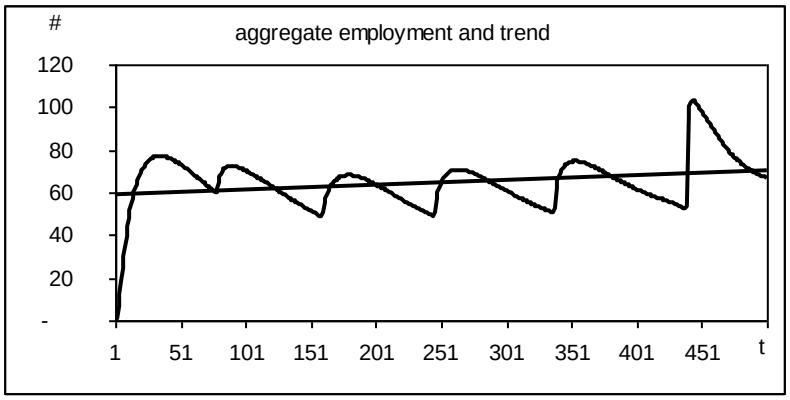


fig. 3) Aggregate employment curve

As can be seen in fig. 3, the aggregate employment curve, constituted by the superposition of the individual sectors' employment curves, can give rise to a constant or growing employment even when the ability of each sector to create employment declines. In our model, economic development takes place and continues due to the emergence of new sectors, which can compensate for the diminishing ability of mature sectors to create employment and growth.

Combined Patterns of Economic Development

To answer the question of market penetration on the consumers' side we need to clarify how large the share of the income of consumers is which might be spent for the new goods and services. Basic necessities must be provided for before a large fraction of the population can afford to buy higher goods and services. Such possibility requires the

fraction of income per capita allocated to purchasing necessities to fall in time to make room for higher goods and services. The problem can be represented by calling all the income remaining to the average consumer after purchasing necessities *disposable income*. In fact, in view of the nature of our model in which new types of goods and services are continuously created during the process of economic development, the extra income required to purchase the new goods and services can be considered the disposable income corresponding to those goods and services. The emergence of such disposable income occurs due to the three trajectories described above. First, growing productive efficiency can be expected to reduce the production costs of incumbent goods and services thus reducing prices and thus making room for the purchase of new ones. Second, the investment aimed at creating the production capacity necessary to produce new goods and services gives rise to an income effect which raises income per capita. Third, the increasing quality and differentiation of goods and services gives rise to higher salaries corresponding to the higher competencies required to produce them. These three trajectories can be combined in different proportions and give rise to different paths of economic development.

The Co-Evolution of Innovation and Demand

To explore how the emergence of innovations generates the disposable income required to purchase them, we modify the demand function which we had used in previous versions of our TEVECON model and include an income related component (equation 3):

$$D_i^t = D_i^0 \cdot D_{Disp,i} \cdot \frac{Y_i \cdot \Delta Y_i}{p_i} \qquad (3)$$

where D_i^0 is the initial demand for the output of the new sector i, $D_{disp,i}$ is the disposable income which can be allocated to purchase the new good or service i. Y_i and ΔY_i are the level of services supplied by the new product/service and the degree of product differentiation, p_i is the price of the new product/service. The disposable income $D_{disp,i}$ can be calculated by subtracting from total income the expenditures on all previous goods or services. In the TEVECON model such disposable income is created due to the combination of the growing productive efficiency of pre-existing sectors and of the increased output and employment following the creation of a new sector based on an important innovation. The extent of the increase in income thus generated depends on the size of the market for the new product or service and on all the parameters affecting the demand equation (3).

The results for the new demand function correspond to what we call a standard scenario which we now take as the basis for our further explorations.

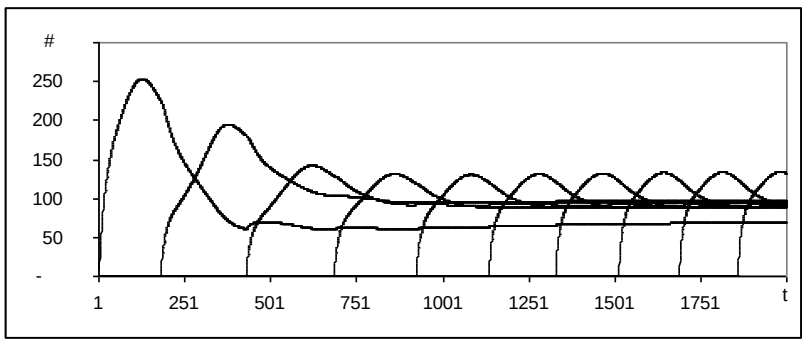


fig. 4) The number of firms N_i^t in different sectors of the economic system

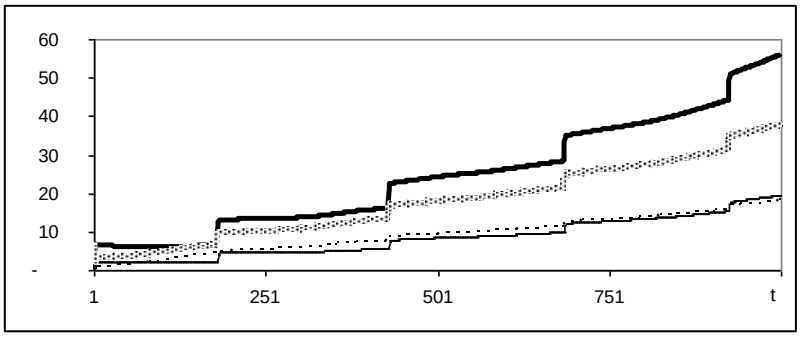


fig. 5) Income (bold curve), Consumption expenditures (dotted curve), Total Investment (thin curve), Consumption expenditures + Total Investment (grey curve)

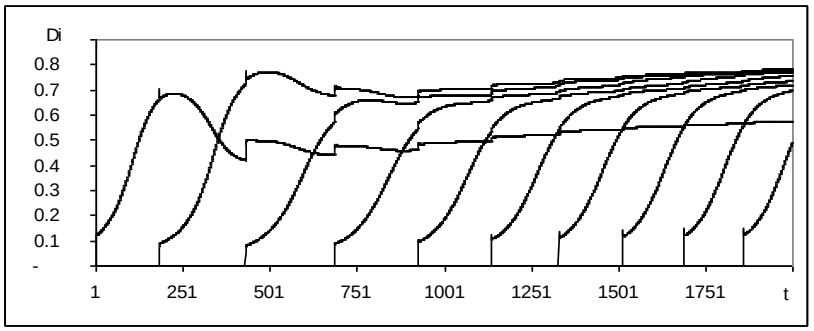


fig. 6) Demand in different sectors

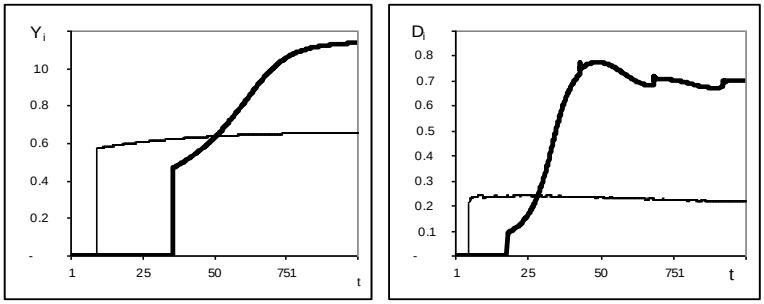
The time path of the number of firms N_i^t (fig. 4) and of income (fig. 5) is qualitatively similar to that obtained in previous experiments (compare with fig. 1a). To be noticed is the faster fall in the number of firms in subsequent sectors. The income generated (fig. 5) keeps rising all the times. The emergence of each sector is accompanied by an initial period of very fast increase in income followed by a period in which income rises much more slowly. The same step-like pattern is shown by consumption and investment.

The demand curves for individual sectors obtained with our new demand function (fig. 6) differ from those which we had obtained in previous experiments (compare with fig. 2a). With demand function (3) we now find two types of interaction: the emergence of a new sector raises income and as a consequence increases the demand for older sectors giving rise to spikes in the demand curve since part of the higher income is available also for the previous sectors; (ii) the fall in demand occurring in the mature phase of a sector occurs because one way of purchasing new goods or services is to spend less on pre-existing ones. Our new demand function includes an income constraint and, hence, represents not only what consumers would like to purchase, but also what they can actually afford.

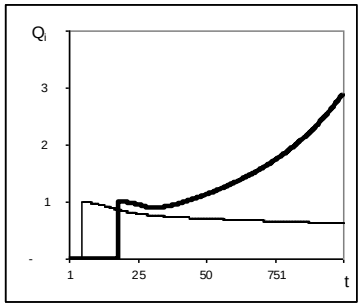
Output Variety, Product Quality and Sector Internal Differentiation

To explore the effect of changing product quality on economic development we modify the parameters of the equations determining Y_i and of Y_i, which represent product quality and product differentiation respectively. We create two extreme cases, one in which there is no change in product quality and product differentiation and one in which these changes are high. We call these two scenarios low quality and high quality respectively. Fig. 7a shows the time path of product quality Y_i (product differentiation ΔY_i develops identically) in the two cases. As could be expected, in the low quality case (thin curve) product quality does not change while in the high quality case (bold curve) it grows. To compare the two scenarios the respective curves are shown for the second industry only. The figures also display that in the low quality case new industries emerge faster due to the limited scope for quality improvements. Technological

opportunities are exploited faster and consequently firms' entrepreneurial actions are triggered faster.



a) b)



c)

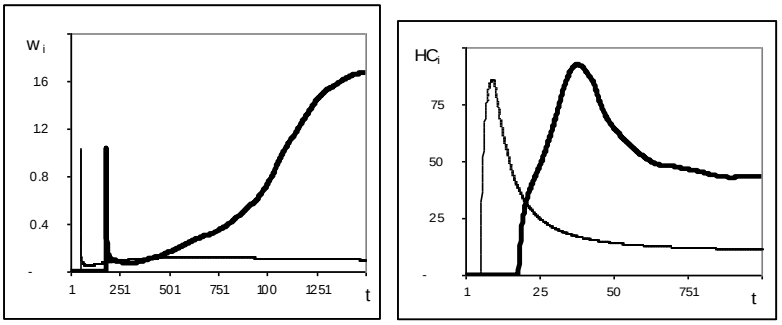
fig. 7a) Product quality, as measured by the services supplied by a product *(Y_i)* in the low quality (thin curve) or high quality (bold curve) case

fig. 7b) Effect of product quality on sectoral demand

fig. 7c) Effect of product quality on sectoral output

On a sectoral level, demand D_i remains almost constant in the low quality case while it considerably grows in the high quality case (fig. 7b). Increasing the service levels and product differentiation leads to faster growth of the respective sector. This is translated directly into output growth (fig. 7c). Output Q_i falls in the low quality case almost from

the beginning. Instead, in the high quality case the firms produce a strong increasing quantity of differentiated and improved outputs.

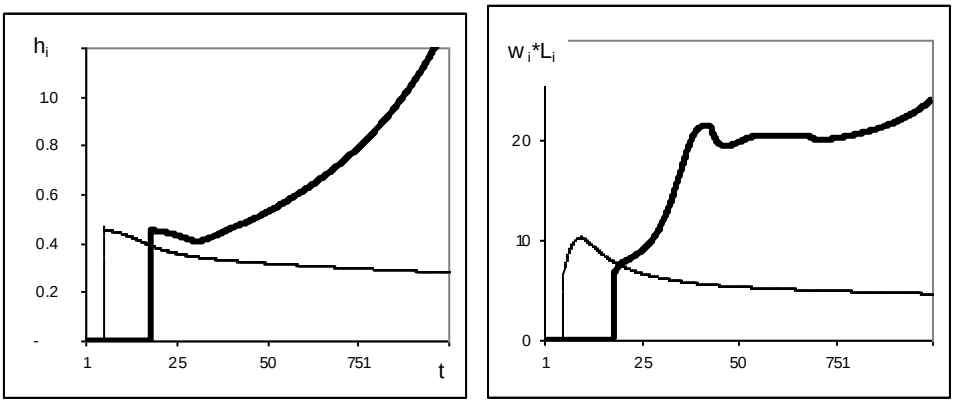


a) b)

fig. 8a) Effect of product quality on sectoral wages

fig. 8b) Effect of product quality on the quantity of human capital used in a sector

The higher specialization and sophistication necessary for production in the high quality case has a strong impact on the development of sectoral wages w_i. Whereas wages remain almost constant in the low quality case, they strongly grow in the high quality case (fig. 8a). We find the observed difference in wage developments to be driven by the difference in the quantity of human capital HC_i. Human capital rises and falls more rapidly and subsequently settles on a lower value in the low quality case compared to the high quality case (fig. 8b). To realize the higher quality levels, sector specific competencies are required which justify higher wages.



a) b)

fig. 9a) Effect of product quality on the quality of human capital used in a sector

fig. 9b) Effect of product quality on the income created in a sector

The quantity effect in the employment of human capital is caused by changing qualities: The quality of human capital h_i falls gently in the low quality case while it grows in the high quality case (fig. 9a). The observed developments in improved human capital and increased wage levels lead to sectoral incomes $(w_i \cdot L_i)$ which in the high quality case continuously increase above the values of income generated in the low quality case which over the observed time interval even start to slowly decrease (fig. 9b).

The analysis on the sectoral level shows an ambiguous effect concerning the impact on economic development in the low and high quality scenarios: On the one hand, the high quality case generates superior level in human capital and wages with the consequence of higher sectoral incomes. On the other hand, however, due to the increased intra-industrial technological opportunities allowing to realize quality improvements and product differentiation, it takes more time for new industries to emerge. To evaluate the

overall effect we need to take the macroeconomic perspective which allows comparing the two different developments paths.

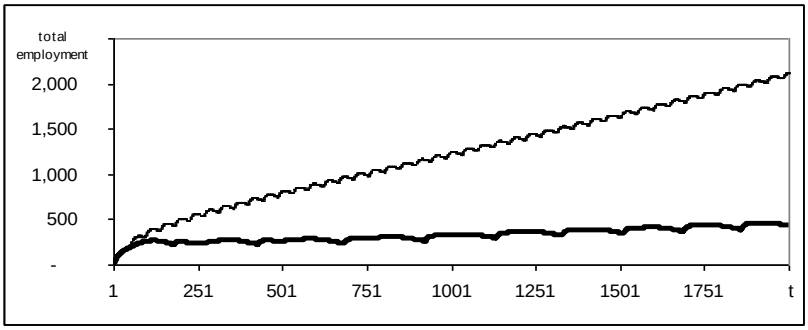


fig. 10) Effect of product quality on the aggregate rate of employment growth

In figure 3 we have seen that in our TEVECON model it is possible to generate positive employment trends in an economy despite decreasing sectoral employment due to rationalization and increasing productivity as well as saturating demand. This positive trend in employment is in principle repeated in the both scenarios under investigation (fig. 10); however, it should be noted that there are severe differences in the two development paths. In the low quality scenario new industries are subsequently emerging in an extremely fast pace. This has a very strong effect on employment. However, one has to keep in mind that sectoral wage levels are very low compared to the high quality scenario, which means that the new jobs created are basically low paid jobs.

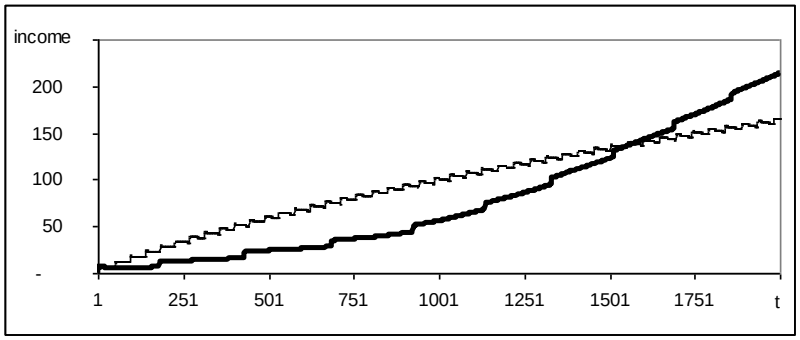


fig. 11) Effect of product quality on the aggregate rate of income growth

Looking at the development of macroeconomic incomes this low wage regime leads also to superior income levels in early stages of economic development. In later stages the income growth in the low quality scenario increasingly decreases whereas in the high quality scenario an increasing growth in incomes can be observed. Finally, the macroeconomic income in the high quality scenario catches up and even leapfrogs the income in the low quality scenario.

The picture that emerges from these experiments is that our artificial economic system is characterized by a higher rate of growth of aggregate employment if the development is based on the creation of new sectors based on new products and services but not on the improvement of the quality of these new products and services after their introduction. However, this higher rate of aggregate growth occurs with lower wages, lower sectoral demand and a lower quality of human capital. Thus, a larger employment pool is created but with an unchanging quality of human capital of the workforce and, consequently, with lower wages and with a lower sectoral demand. In summary, the low quality scenario entails more jobs with lower competencies and lower wages than the high quality scenario. The previous results are not independent of the time horizon

chosen. As figures 10 and 11 show, if we lengthen the time horizon the rate of growth of aggregate income, initially higher in the low quality case, becomes higher in the high quality case. Thus, the tradeoff between the faster rate of aggregate growth and the lower level of individual welfare of the low quality scenario and the lower rate of aggregate growth and the higher level of individual welfare of the high quality scenario exists only in a *relatively short* time horizon. It disappears in a *longer* time horizon: here the high quality scenario dominates both aggregate income growth and individual welfare. However, employment keeps growing faster in the low quality case whatever time horizon we take into account.

The paths of economic development which have been calculated so far are rather extreme and it is no surprise that at least the one with no quality change has not occurred in economic history.

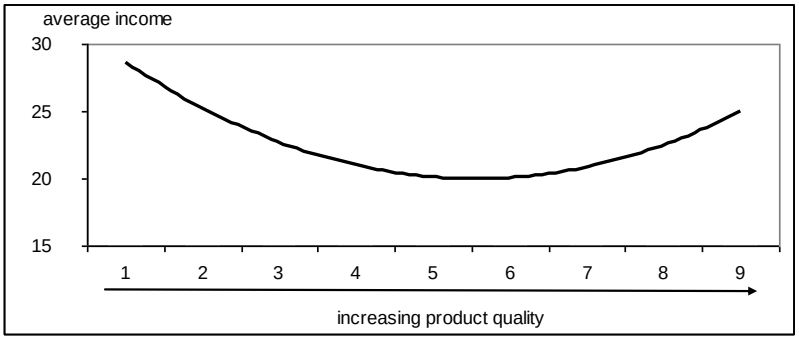


fig. 12) Changing average incomes with increasing importance of quality

Thus, we have to consider the two time paths described above not only as extreme cases but also as possible components of a hybrid path which could have started with a situation in where most consumers only consume basic necessities and continued with a

general increase in income and wealth which enabled large percentages of consumers to consume goods and services of higher quality and differentiation. Furthermore, the observed development paths are affected not only by income per capita but also by income distribution.

However, looking at the average incomes generated over time in the two extreme cases as well as in several intermediate cases (fig. 12) clearly shows a u-formed relationship between quality improvement and income generation. In intermediate scenarios the average income first declines; allowing for the exploitation of intra-industrial technological opportunities worsens the outcome, i.e. the positive effects stemming from increased wages and income are overcompensated by the negative effects of a slower emergence of new industries. After a certain minimum level is reached, the beneficial effects of improved quality are observable which lead to higher income levels via higher levels of human capital and related higher wages, despite lower employment levels.

Before concluding this paper we note that the results presented here imply a mechanism of economic development that started with the period just after the industrial revolution, when most consumers could only afford to buy basic necessities, and continues with a subsequent period in which the three trajectories described above provide income levels that allow large fractions of consumers to purchase new, higher quality and differentiated goods and services. The transition from basic necessities to what we have called 'imaginary worlds' (Pyka and Saviotti 2011) occurred due to the co-evolution of a number of factors: (i) the higher quality goods and services could fetch higher prices;

(ii) the higher income per capita required to purchase them came from the higher salaries paid to workers of higher competencies; (iii) in turn, higher competencies were required to produce the higher quality goods and services; and (iv) those combined trends implied a considerable expansion of the education system, due to the higher income that educational institutions could expect to receive by training increasingly large numbers of people to give them valuable competencies. These ingredients were fundamental components of the pattern of economic development of capitalist countries during the 20th century.

Summary and Conclusions

In this chapter we discuss the concept of creative destruction in the light of a model of economic development based on innovation driven structural change. We show that such a concept cannot have the simplistic interpretation of the substitution of the old by the new, but that a deeper interpretation of the concept requires us to take into account the joint effect of the three trajectories of (i) increasing productive efficiency, (ii) the emergence of completely new sectors; (iii) the increasing quality and differentiation of incumbent sectors. The long run development path of capitalist countries could not have occurred by means of just one of these trajectories alone. An economic system with a fixed number of sectors with homogeneous products in presence of growing productive efficiency would have collapsed if the bottleneck caused by the possibility to produce all demanded output with a falling proportion of the labour force had not been compensated by the emergence of completely new sectors and by the higher quality and differentiation of incumbent sectors. Yet these two compensating trajectories could have

been created only by the surplus generated by the growing productive efficiency of incumbent sectors.

In this chapter we show the effect of different possible combinations of the three trajectories by focusing on two extreme cases, one without quality change and one with a pronounced degree of quality change. The results of our calculations show that the 'no quality change' scenario could have produced a higher rate of growth of employment than the high quality scenario, but only at the cost of having persistently low wages, competencies and human capital in all sectors. We interpret these two scenarios as extreme cases defining a region in our parameter space within which patterns of economic development similar to the observed ones occur.

Our results are compatible with mechanism of economic development in which increasing product quality and prices, higher competencies ad education levels, higher wages and income levels co-evolve to produce the pattern of capitalist economic development observed during the 20th century. In this context the concept of creative destruction does not systematically entail the substitution of old sectors by new ones but needs to include the effect of the emergence of new sectors and the increasing quality and differentiation of incumbent sectors. Both these two trajectories reduce the potentially destructive effect of growing productive efficiency and provide renewed avenues for creation. Thus, there is more creation than destruction, although various forms of destruction persist.

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