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Macroeconomic Stability: Sustainable Development and Full Employment

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Abstract

This paper focuses on some macroeconomic implications of sustainable development. Is it possible within a market economy with private property rights to diminish the ecological pressure through a reduced material production without causing unemployment? It is argued that the obvious solution to the question is a zero-growth policy combined with a labour sharing mechanism which could be organized through a system of tradable work-permits.

In a market economy the growth rate is determined by *effective demand*. Hence, macroeconomic policies play a crucial role. If the growth rate is fixed below the trend in labour productivity the number of unemployed people will increase. Such a development can be prevented through a proportional reduction of the average working hours per person employed. That would require an institutional change which simultaneously reduces the total numbers of hours worked within the macroeconomy. Each member of the labour force could be given *work-permits* matching a proportional share of the total number of working hours. Trade in these work-permits could be organized as a regular market following the same principles, as we know from e.g. tradable pollution-permits.

Keywords: Sustainable Development, macroeconomic, imbalances,

effective demand and employment

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Macroeconomic Stability: Sustainable Development and Full Employment

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Questions to be discussed

Today, the paradoxical situation is that goods are produced not because they are needed – agriculture and the car industry are the outstanding examples – but to prevent unemployment from going up any further. The Western societies seem to have given up the ambition of creating a sustainable development in an attempt to rescue the labour market from rising unemployment.

Anyhow, this vicious cycle could be broken if governments started to implement the zero-growth strategy as presented below. Then people would get more leisure time organised according to individual preferences. They would be able to keep their present standard of living. This would make it possible to employ the productivity gains in such a way that the Western societies could embark on a production path leading to sustainable development.

What are the macroeconomic consequences of such a rigorous implementation of *sustainable development* with special regard to the negative impact on employment/unemployment? What can economic theory tell us, in general, about the interrelationship between the traditional macroeconomic variables and increased environmental considerations?

Does an economic system based on capitalist principles require an ever increasing output to keep itself 'on track'? Is the market system like a bicycle – does it have to keep on going at a certain speed not to be wrecked? Or does the economic system start to 'spin' when the growth process is slowed down – like the bicycle that starts to wobble when the speed is lowered? Is it likely that the market economy has these bicycle-like properties?

Sustainable development has to be analysed within a macroeconomic framework. In section 3 I argue that one can get inspiration for a realistic macroeconomic theory from post-Keynesian economics. That theory places effective demand and economic policy as the pivotal elements for sustainable development with full employment. In the final section I present a concrete example of how unemployment can be avoided.

The growth addicted developed countries

Environmental degradation is a contemporary global phenomenon. Furthermore, as we know, the global economy is becoming more and more interrelated and interdependent. Bearing these facts in mind, I will begin this paper by considering the likely impact of a change towards a more sustainable economic growth on the industrialized countries with a yearly per capita income of more than $20,000. This focus is chosen for two reasons. First, it is the material consumption and the continued economic growth of these rich, post-industrialised countries which indisputably have the largest impact on the *global* environment (exhaustion of limited resources and accumulation of pollution). Second, a zero growth rate in these countries would not make any people starve, if work and consumption were distributed fairly.

The performance of these rich, post-industrialized economies in the after-war period was characterized until the early 1970s by high growth rates, full

employment, exponentially growing energy consumption and a fast deteriorating environment. From the 1970s economic growth rates started to slow down (from 4 percent per annum to 2-3 percent per annum). This, after all, minor slowdown in the pace of economic growth, which emerged simultaneously with the first energy price hike, made unemployment an inherent part of the Western economies. Until the early 1970s, the registered rate of unemployment in Europe had not exceeded 2-3 percent, but suddenly it jumped and reached double digits in the 1980s and 1990s.

Superficially viewed, it is tempting to see a direct causality from higher energy prices and increased environmental concern in general to slower economic growth and further on to increased unemployment. Why this is only a part, in fact only a minor part, of the explanation of the macroeconomic development will be explained in the following section on macroeconomic theory. Anyhow, from a market economic point of view one should rather have expected that higher energy prices would have increased the demand for labour at a given growth rate. This rising number of unemployed people tells us that productivity of labour together with changes in the strength of the growth process seems to dominate the substitution effect caused by changes in relative (factor) prices.

Before examining the macroeconomic arguments of how energy prices, economic growth and employment are related in greater details, it is also important to investigate developments in energy consumption. The picture is, of course, blurred. Energy is a strategic and highly politicised commodity. Nonetheless, a general pattern can be discerned in which a doubling or tripling of energy prices have caused a fall, but only a relative fall in the energy consumption compared to GDP (increased energy productivity). Although this substitution effect has been sluggish energy efficiency has, at least in Europe, increased ever since the first oil price hike took place. This trend has continued even in periods when world market prices have fallen, because domestic and world energy prices have been separated due to energy taxes. In fact, it would be a better measure to use the domestic price level when the price elasticity of energy consumption by households is calculated. There has been, except for the US, an upward trend in energy taxes since the oil price collapse in the middle of the 1980s.

Macroeconomic considerations

Unfortunately, macroeconomic analysis is not straightforward. There are many, and competing, schools of macroeconomic theory each of which provides a somewhat different picture of the main driving forces behind the growth process. Phelps (1993) and Snowdon, Vane and Wynarczyk (1994) count *Seven Schools of Macroeconomics*. At the end of the day the number of different schools can be boiled down. Depending on the purpose of one's analyses, it is not necessary to discuss all seven schools. I have, drawing my inspiration from Keynes, reduced the number of Schools to two major ones (Jespersen, 2000):

1. Supply School, where 'the long run general equilibrium' is determined by supply factors and relative prices. (Neoclassical economics)
2. Demand and 'uncertainty' School'. (Keynes inspired economics)

On the one side are those who believe that the existing economic system is, in the long run, a self-adjusting system, though with creaks and groans and jerks and interrupted by time lags,

outside interference and mistakes.... On the other side of the gulf are those that reject the idea that the existing economic system is, in any significant sense, self-adjusting. The strength of the self-adjusting school depends on it having behind it almost the whole body of organised economic thinking of the last hundred years, Keynes, 1973, vol. XIII, p.485).

The above quote expresses Keynes' sceptical attitude towards the use of a general equilibrium model as a relevant analytical tool. It was primarily the deterministic and reductionist methodological approach underpinning macroeconomic theory of his time (neoclassical economics represented by A.C. Pigou, *The Theory of Unemployment*) that he revolted against.

According to Keynes macroeconomic theory has to be grounded in 'realism'. What can we *know* about the *economy as a whole* today and in the future? Macroeconomic analysis is concerned with the performance of the entire economic system. Within that macro framework there is room for many different hypotheses about microeconomic behaviour. Keynes's main emphasis was that individual actors have to act even though they only have a limited and uncertain knowledge about the future. Keynes did not quarrel about the postulated profit or utility maximizing behaviour – or any other reasonable behavioural assumption at the micro level. His concern was how to establish a relevant theory of the driving forces of the entire productive system. For that reason he called his macroeconomics *a monetary theory of production.* It was the interplay of real and monetary factors in an economic system characterized by fundamental uncertainty which really made the analytical difference between him and his predecessors.

Uncertainty – caused by lack of knowledge about individual behaviour, structural organisation and future events - cannot from an epistemological point of view be reduced to statistical uncertainty and, therefore, cannot be analysed within a general *equilibrium* model! When that is understood (and accepted) the neoclassical growth theory looses analytical force.

Post Keynesian macroeconomics is grounded in realism. Having said that, it becomes more obvious why it is rather limited what any relevant macroeconomic theory can tell about economic performance in a long run perspective. Even the short run should only be predicted with a high degree of caution.

Anyhow, having the above mentioned limits in mind, one can point to three analytical stepping-stones which might be useful for the detection of the development of the *economy as a whole* from a *sustainable development* perspective:

1. The *actual growth path* is dependent on history, the composition of effective demand, supply factors, innovations and mere chance.
2. *effective demand* is the main macroeconomic factor determining the growth *rate* of any well functioning market economy
3. *supply factors:* a) productivity, b) limited natural resources, contamination caused by outlet of waste and pollution, and microeconomic incentives:

    a. supply factor (1): persistent *improvements of total factor productivity*

b. supply factor (2): absolute scarcity and relative factor prices - substitutability and/or complementarity in the production process
c. supply factor (3): microeconomic incentives

Ad 1. The Western market economies have been growing for the last two hundred years or more. The growth potential increases for a number of reasons: more capital equipment, specialization, technical innovations, a better-educated and trained labour force and the continuous depletion of natural capital. The point is that any specific growth process is influenced by a number of past and present factors which make the process *path dependent* in the sense that history matters and can only very slowly, if at all, be reversed. For instance, when a country has based its power stations mainly on nuclear energy, the decision is binding for years to come.

Any radical transformation of Western societies in the direction of greater sustainability has to be a smooth process if historical experiences is to be of any relevance. Of course, I do not speak about a traditional neoclassical growth model analysis based on perfect factor substitutability, perfect foresight (rational expectations) and perfect competition. The approach I have in mind is what Joan Robinson later on, with inspiration from Keynes, coined the *methodology of History (in contrast to Equilibrium)*[1]:

> *The object of our analysis is, not to provide a machine, or method of blind manipulation, which will furnish an infallible answer, but to provide ourselves with an organised and orderly method of thinking out particular problems; and, after we have reached a provisional conclusion by isolating the complicating factors one by one, we then go back on ourselves and allow, as well as we can, for the probable interactions of the factors among themselves. This is the nature of* ***economic thinking***. Keynes (1936), p.297

Ad 2. Keynes defined *effective demand* as the proceeds which firms *expect* to receive from the production they plan to undertake in the future. Hence, the level of macroeconomic activity is guided by effective demand which in fact is derived from expectations held by firms about future sales proceeds counterweighted by information about the costs of production. Firms do not necessarily maximize profits, but they have to expect that the proceeds one way or the other will cover costs - if not every day of production, then at least within the planning horizon.

The formation of expectations by business is crucial for effective demand. Firms are assumed to form rational beliefs about the future. They try to make as good use as possible of available information; but they can, of course, never get full information about the future or about the functioning of the entire macroeconomic system[2]. There will always be a certain element of the unknown, but firms have to decide what to produce and how much to produce. Hence, effective demand can never be fully described in mathematical language.

The economic growth process is in poor countries perpetuated by an increased population, although often too slow and too little to feed the increasing number of

[1] The specific methodological approach has more recently been identified with 'critical realism', cf. Lawson (1997).
[2] Which are the assumptions behind the concept of 'rational expectations' used by many neoclassical theorists.

people (Malthus). In richer and more developed countries, where people have sufficient income to cover their basic needs, the growth process is primarily directed by *effective demand* (Keynes). Hence, supply capacity is running ahead of people's desire to consume material goods. When societies grow richer people's preferences are directed towards a reduced working load and good public care.

Ad 3. Below I will set up a simple scheme of 'economic thinking' about a sustainable growth process from a post-keynesian tradition[3]. Sustainable development is defined in political/physical terms, not in economic terms[4]. Factors of production at a global level consist of: Labour, man-made capital, land, natural resources and the quality of the biological sphere (environment).

The degree of substitutability/complementarity within the economic system (of effective demand, production and use of factors of production) is of interest when the impact on the environment of different growth strategies is to be analysed.

Box 1. '*Thinking about Sustainability*' as a macroeconomic (demand driven) process:

(1) Effective demand $*(1+g)^t$ => economic growth => demand for factors of production, energy and outlet of pollution devided by $(1+ (e – g))^t$

where,
e – average growth in total factor productivity
g – average growth in effective demand

The starting point of the analysis is a specific historical context at t = 0. Using the national accounts, one can calculate the actual figures for demand, production and the use of factors of production (working hours, capacity utilisation, depletion of resources and pollution).

One characteristic feature of modern societies is that labour *productivity* is increased year by year. The utilisation of an unchanged amount of factors of production will increase production, or, said slightly differently, an unchanged level of production requires fewer and fewer factor inputs. This is the 'magic' of the market economy.

History also tells us that specific productivity gains are correlated with changes in relative factor prices. When land became scarce in Europe in 19th century crops were improved and fertilisers applied, but not quickly enough to prevent starvation and an exodus to overseas countries. Then labour became scarce when manufacturing took the lead. Trade unions were formed and labour got, for a while,

[3] A more elaborated scheme of thought on economic growth constrained by the balance of payments, cf. Thirlwall (2002).
[4] There are several definitions of 'sustainable development' – ranging from 'strong' to 'weak'. I will not go into that debate here, I just want to stress that the value of 'sustainability' cannot be calculated, only the *economic costs* of fulfilling different environmental objectives might be quantified *and* compared.

a rising share of the value added. That changed the innovation processes in the direction of labour saving machines and import of goods from third world labour abundant countries. Of course, it is not solely changes in relative factor prices which have caused the substitution and productivity gains. In addition a number of administrative regulations have supported labour protection and labour saving inventions – for the benefit of business and of labour, but, unfortunately, not of the environment.

The time has come when exhaustible resources and unspoiled environments have become increasingly scarce. Those environmental factors, which are protected by private property rights, have experienced rising prices - the outstanding example is, of course, fossil energy. However, the market mechanism is only of limited use, because on the one hand the scarcity of exhaustible resources is a long-term *stock* phenomenon clouded by uncertainty (uncertain knowledge) and on the other hand, market prices are guided by short sighted *flow* considerations. Market prices react to flow imbalances, but do not have the capacity to correct future imbalances in stock variables. The observation applies also to financial markets, where stock/debt can build up for years before the creditors suddenly loose confidence and the much delayed devaluation of the currency occurs. The collapse of ecological systems might follow the same pattern – *we simply don't know* (to speak the language of Keynes).

But still, within the historical context, it is important to emphasise that it is the size and the composition of *effective demand* that primarily drives the growth process forward. Furthermore, the specific direction it takes with regard to the use of different factors of production depends on the production structures, innovations and relative factor prices.

Macroeconomic policies, effective demand and economic growth

According to post-keynesian macroeconomic theory economic policy is one of the main determinants of effective demand and by that of the size and the composition of economic growth. The use of factors of production is determined by the growth process, factor productivity and relative factor prices. The unfortunate thing is, that our knowledge of the productivity enhancing factors is rather limited.

Just to give a feeling of the magnitude of productivity gains I have presented one rather simple, but presumably not atypical empirical study of the Danish economy in the post-war period:

Table 1. Contribution by factors of production to economic growth, Denmark 1960-99

1. Growth rates': 2.Private sectors:	a. Economic growth pct. p.a.	Contri-bution by:	b. Increased real capital pct. p.a.	c. Working hours pct. p.a.	d. Labour productivity pct. p.a.		Energy productivity[1] pct. p.a.
Manufacturing	3.0	=	0.9	-0.9	3.0		2.0
Private service	3.0	=	0.8	0.0	2.2		0.8
Agriculture	2.1	=	1.3	-4.4	5.2		2.1

Source: Pedersen (2000), p.77-89 and Jespersen (1998), table 10.3, p. 151
Note 1: columns b., c. and d. add up to a. Energy productivity is supplementary information (1966-90)

Table 1 shows that labour productivity has out-paced economic growth to such an extent – except for private service – that the number of working hours undertaken in the private sector has fallen throughout the entire period. This process of continuously increasing labour productivity seems to be a common feature of a well functioning capitalist market economy. Unfortunately, we have only vague ideas about the extent to which increased productivity is an endogenous or an exogenous component of the growth process. There are arguments in favour of labour productivity being determined by 1. better education, 2. specialization, 3. on the job training, and 4. labour saving innovations. One could say that 1. and 2. are ongoing processes largely independent of the underlying growth performance. Whereas 'on the job training' requires that jobs are available – fewer or more insecure jobs mean less training. The final argument is probably the most important one, because labour saving innovations are based on business expectation that labour will become relatively more expensive in the future[5].

Furthermore, the government can twist the composition of effective demand between different kinds of demand for good and services. In the Danish context there is one major dividing line with regard to use of energy and labour. This is on the one hand the demand for private goods and service and on the other hand the provision of public services. Production of traditional public services (care, education, administration and to some extent health) has a higher labour content and a much smaller (negative) impact on the environment (energy consumption) than private goods and services (in general). If we look at table 2 we see that demand for goods and private services (transport, entertainment, charter travel, finance, communication etc.) have a surprisingly similar pattern with regard to employment and energy when we calculate the total factor input using an input-output table of the Danish economy. Looked upon from this holistic point of view, private services (as different to public services, at least in the Danish case which I have closely investigated) turn out, in the input-output table, to be even less labour

[5] Unfortunately, there is not space within this paper to analyse the causes of increased factor productivity. I take the development of total factor productivity as exogenous, but the division of this overall gain of productivity on the separate factors of production I assume is partly explained by relative factor prices. That assumption is in contract to conventional production theory where relative factor prices mirror relative factor productivity.

demanding than manufactured goods and to absorb approximately the same quantity of energy per million Dkr. value added, see Jespersen (1998).

Table 2. Labour and energy per million Dkr. value added in different production sectors, Denmark 1990

	Share of GDP pct	Employment (persons)/mill. kr.	Energy (Tj)/mill. kr.
Manufacturing	18.3	2.65	1.12
Private sector services	46.4	2.35	0.92
Public sector services	22.5	4.18	0.41

Source: Jespersen (1998), p. 150

This analytical result does not leave much room for obtaining beneficial effects by twisting private demand from goods to private services. It is by boosting the demand for soft services (health-care, education, local activities) that some environmental alleviation could be expected.

Furthermore, it has been calculated that real capital and energy consumption are complementary factors of production. This means that if capital equipment is installed as a substitute for labour it will automatically increase the use of energy – given the historical record.

As we have seen, increased traditional economic growth is good for employment, but a strain on the environment. In fact, the Danish government took that aspect into consideration when the economic growth process was speeded up during the 1990s. The expansive fiscal policy was combined with a 'green tax reform'. This policy measure detached, to some extent, the increased growth rate of private consumption from energy and water consumption and CO_2-emissions. In many ways it was rather exceptional that economic growth could be increased substantially, while the current pressure on the crucial environmental flows was kept unchanged.

On the other hand, one should not exaggerate this result, because the overall development was still far from being sustainable. Unchanged consumption and unchanged flows of pollution mean that the exhaustion of stocks of natural resources and the accumulation of CO_2 continued at the same (unsustainable) pace as previously.

If we take a longer time perspective on the relation between energy consumption and economic activity in the Danish case, then we see that the correlation between economic activity and the energy consumption has been rather weak for the last 30 years (Hansen, 1999). Although the economy as a whole has grown by 2½ percent p.a., energy consumption has remained quite stable since the 1970's. This means that energy productivity with regard to GDP has gone up by approximately 2½ percent p.a.[6]. If we go behind the aggregate figures for energy consumption we find

[6] This is a bit higher than the number in table 1, which covers the period 1966-1990

that there is a striking difference between consumption by households (electricity, heating and private transport) and by firms (process and transport). Apparently, it is the household sector that really has made the significant contribution to the detachment from economic growth by reducing its energy consumption by 20 percent since 1973, whereas the production sectors have increased their energy consumption by another 20 percent. These different developments demonstrate that the green tax policy does matter. Energy taxes imposed on households have made energy goods relatively expensive compared to disposable income ever since the first energy crisis hit in 1973. Firms, on the other hand, have been taxed much lighter for the sake of avoiding a unilateral deterioration of the international competitiveness. In fact, there has been a fall in the (real) world price of energy since the early 1980's which has been passed through to the business sector and slowed down improvements in energy productivity.

Furthermore, it is an unsettled question as to what share of the reduced demand by households that is a direct reaction to increased energy prices and to what extent the reduction of the energy consumption can be referred to structural changes: improved supply of heating (from power stations) and a combination of forced and subsidised improvements of the insulation of private homes. The same question applies to the business sector which has also had access to a number of subsidised energy saving schemes.

How to reduce material consumption without creating unemployment

From a macroeconomic point of view there are quite a number of similarities between the balance of payments constraint and an environmental constraint. In the first case, the 'consumption' of foreign exchange has to be reduced, in the second case it is the consumption of non-renewable resources and emission of dangerous waste/pollution that has to be diminished. In both cases it is an important side condition that a negative impact on employment should be avoided.

This parallel has given me the inspiration to have a short look at how the balance of payments constraint can be lifted, cf. Thirlwall (2002). The standard textbook answer is to improve the international competitive position of domestic goods through wage policies and/or a devaluation of the national currency. This is the traditional export led growth strategy with no consideration of its impact on the environment. A more environmental friendly strategy would be to reduce the domestic demand for foreign goods by a reduction of the purchasing power through increased taxation. That would surely cause unemployment to rise, unless it is combined with a comprehensive scheme of work sharing. If one goes 10 years back in time, the debate on how to share the limited workload was very present because at that time the unemployment rate was above 12 percent (in Denmark and many other Western countries).

At that period, it was common to talk about "jobless growth", because the annual growth rate was below the current increases in labour productivity. The idea of these work-sharing schemes was to distribute the reduced number of working hours obtained through the productivity gains in a fair way among the labour force. Forced unemployment is a scourge – whereas a collective and equal reduction in average working time either through a shorter working week, longer holidays,

parental or educational leave, or early retirement is often considered as a welfare gain.

It is much easier to get political acceptance of the beneficial effects of work-sharing when unemployment has gone up. It is much more difficult to get the same hearing from the politicians when the concern is about the environment and not foreign exchange. But in real life people are worried about the deterioration of the environment, which they feel is a direct threat to their health, contrary to the abstract concept of 'balance of payments deficit'. In fact, even in periods of relatively low unemployment workers have been ready to accept a shorter working week without income compensation as the outcome of the yearly collective wage negotiations. The ever increasing productivity gives labour a real choice between shorter working hours and increased real wage (or any combination of the two choices).

We can employ this idea more explicitly when environmental protection is on the political agenda. Foreign exchange could be saved through higher import prices and/ or reduced private consumption. The environment can be saved through higher 'green prices' enforced by 'green taxes' or reduced private consumption of goods and service, cf. table 2. The parallel is striking.

There are two kinds of popular resistance to 'green taxes'. One comes from people with low incomes because they will carry a disproportionate share of these taxes which they, for good reasons, consider as unfair. This objection could rather easily be overcome by a progressive tax scale on electricity, water, gas and oil for heating and a reduced tax for collective transport combined with a specific tariff on emissions from power stations. Furthermore, the tax revenue could be redirected towards tax relief on labour income and public goods mainly provided for low income groups. The other objection comes from exporting industries using exhaustible resources and causing pollution. These firms argue that if they are 'punished' by green taxes, production will move abroad. That might be the case, especially if the international society keeps on producing in an unsustainable way. In that case currency devaluation could be needed. Environmental protection has a price which society, as a whole, has to pay through a slow down of the traditional economic growth compared to what otherwise would be the case. Of course, if all Western countries introduced green taxes or pollution permits at the same time the reduction of the economic growth in any specific country would be smaller.

A thought experiment

What might happen to Western societies if it were decided by e.g. the OECD that the current level of consumption is enough, cf. Durning (1992). This is, of course, a utopian idea as far as production is unequally distributed among nations and citizens. A society (not to speak of a world) with a relatively equal income (and wealth) distribution is more willing to accept the proposition that 'enough is enough' when the basic needs are generously fulfilled and the social pressure of having certain material status symbols is limited.

Anyhow, let us assume that a zero growth rate in GDP is decided by Parliament. What would happen when such a restrictive fiscal policy is implemented in a decentralised market economy? That is not difficult to predict, because when effective demand is reduced the number of unemployed people increases. To

prevent that government has to combine the zero growth in effective demand with an initiative to share the reduced number of working hours in a fair way among the entire labour force. In this case the government could get some inspiration from the tradable permits of pollution. The government could initiate this new era of zero growth by distributing a voucher/work permit to all people in the labour force which gives the holder the right to undertake a certain number of working hours free of charge. If they want to work more than this (free) number of hours they have to buy (or receive as a gift) extra hours at the market for 'work permits'. If you want to work less than the average you are free to sell the excess amount of work permits. People who leave the labour force (permanently or for a while) and get a public income transfer will not receive any (free) work permits. That will not prevent them from working if they buy a work permit.

One may wonder to what extent this ceiling on the number of hours worked can restrict the growth rate. The point is that firms and wage earners know in advance that each year the amount of work permits will be reduced proportional to the increase in labour productivity. In that case the macroeconomic outcome is a zero growth, but at the individual level any worker is free to work more hours (or shorter hours) if one can get hold of more work permits. The historical record tells us that by and large the needed reduction in the number of working hours is 2 percent each year. In fact, if this policy was implemented, people would also know that the volume of consumption would not go on growing. The 'buy and throw away' culture had to change. People might be more conscious about what is really a necessity to consume when one cannot expect to get more of everything. One could even expect people to demand more durable goods.

Zero growth will also be beneficial for the environment. When GDP stops growing the increased energy productivity will also reduce the current/flow consumption of energy. Within 35 years, a 2 percent yearly productivity gain will halve the demand for energy. If at the same time the supply of renewable energy is expanded, then the day of a sustainable energy sector is within sight. In a number of areas, environmental protection does imply that labour productivity is increased more slowly than previously. The use of pesticides and fertilizers in agriculture has increased labour productivity (at least until they reach the ground water). The division of labour nationally and internationally has increased productivity through specialisation and economies of scale, but at the cost of long distance transportation. Renewable fuel means more expensive transportation costs and a slowdown in future labour market specialization. It is likely that increased environmental concern will reduce the growth of labour productivity

Unfortunately, I see at least two macroeconomic snakes preventing this paradise from coming about without difficulty. When labour becomes more scarce, successful firms will try to substitute man power with robots thus raising the GDP growth rate (and energy consumption). It would be a great mistake to restrict the number of machine hours when they are installed. Furthermore, the increased GDP will be registered as increased labour productivity which is accounted for when the amount of work permits is decided upon the following year. To be honest, it would just be nice if machines would take over all the boring jobs.

A much more difficult problem to handle would be how to prevent cost push inflation in periods where labour is in short supply. One may recall the 1960s and early 1970s when there was a scarcity of labour and cost inflation went higher and

higher in an attempt by labour to get a larger share of the value added. This period lasted more than a decade and caused high unemployment in order to squeeze inflation out of the wage-price-wage formation. One solution is, of course, through demand management policies, to ensure that effective demand for goods and services is also restricted to a zero growth rate. That would probably mean that in periods with shortages of labour tax rates would have to be increased to moderate the imbalance. Another and more constructive way forward would be the introduction of profit sharing scheme as the main distributive mechanism in the private sector. In the public sector, there is no profit to share. I have no straightforward suggestion other than to let the public sector tail the private, because the international competitive pressure is somewhat stronger in the private sector.

The individual wage-earners will not be constrained by the number of work-permits they receive; because these permits are intended to be made tradable and therefore more flexible than a given and unchangeable maximum. Those people who want to work extra hours are allowed to do that when they have bought extra permits in the market. Expenses that labour might be able (partly) to pass over to the hiring firms. In that case wage costs will increase, because labour has become more scarce than otherwise. That is, anyhow, the price which society has to pay for any full employment policy. 'Full employment' requires social responsibility by trade unions and an institutional shift in the content of wage negotiations where emphasis should shift from nominal wage increases to real wage or even better to profit sharing. Such a shift could prevent a deterioration of the international competitive position.

Of course, any specific national policy is difficult to implement in an economic system which is becoming more and more globalised. The standard reaction to any proposal of this kind is that if it is not adopted by a majority of countries, it is too easy to bypass. We know that answer from the debate about the Tobin Tax on international capital flows. Anyway, this problem of transnational activities is not that big when the labour market is considered. Labour markets, even within the EU, are still very much considered as a national concern.

Concluding remarks

Historically, it was considered a political necessity to have a substantial growth in GDP to improve welfare and at the same time to prevent unemployment from rising. Now, the welfare goals have been fulfilled, but at a cost of an unsustainable development. Furthermore, the ever growing labour productivity makes it necessary to let the GDP grow by 2-3 percent each year just to keep the number of people employed unchanged. Whenever the growth rate of GDP falls below this 2-3 percent, unemployment seems to rise inevitably.

That unstable situation begs the question, whether it is possible to slow down the growth of (material) consumption without causing unemployment? The short, simplistic answer to this question is a plain 'yes'. Because, if the average working hours per employed person are reduced by 2-3 percent each year, then 'unemployment' could be shared equally by all workers in the form of more leisure time. The scourge of unemployment would be transformed to the gift of a shorter working time combined with an unchanged real income and even more important a first step toward sustainable development! This proposal of work-sharing could be

implemented through a system of tradable *work permits* distributed equally among all people with in the labour force – much the same way as tradable pollution permits are introduced as a remedy of reducing the emission of CO_2.

To ensure macroeconomic balance on the labour market it is important that the government puts the brake on the growth of effective demand for goods and services through an active *demand management policy*.

It is a myth that a *capitalist economy* cannot function at a constant GDP by making the entrepreneurial climate stagnate. That does not have to be the case, because underneath the surface of an unchanged overall production there will be a myriad of different firms. It is also a myth that firms have to grow to be successful within a capitalist market economy. Growth is not a necessary condition for profit maximization. On the contrary, it is quite easy to demonstrate that firms that maximize growth are forgoing some profit in their fascination for growth. As a consequence of this trial and error process some firms are successful and they will expand, others are less successful and they will contract. Furthermore, each year society becomes one year older which means that some shop owners/farmers and wage earners will decide to retire. That creates opportunities for newcomers to set up a new production unit or to fill a vacant labour market position. At the micro level, firms are indifferent as to whether the total volume of the economy expands or contracts, because they have, anyhow, only a small fraction of the entire trade. Their task is to be as efficient and competitive as possible given, not the size, but the structure of the market economy domestically and abroad.

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