WIIW Working Papers

No. 10
March 1999

Michael Landesmann and
Robert Stehrer

The European Unemployment Problem: A Structural Approach

Michael Landesmann and
Robert Stehrer

The European Unemployment Problem: A Structural Approach

Michael Landesmann, research director at WIIW, is professor of economics at Johannes Kepler University, Linz, Austria; Robert Stehrer, WIIW researcher, is lecturer in economics at Johannes Kepler University.

Contents

List of Figures

List of Tables

THE EUROPEAN UNEMPLOYMENT PROBLEM: A STRUCTURAL APPROACH

Michael A. Landesmann and Robert Stehrer[1]

1 Introduction

In this paper we examine an important dimension of structural change which has so far been insufficiently accounted for in the discussion of the high levels of European unemployment, especially its development over the 1980s and 1990s: A detailed examination of sectoral employment patterns shows that a significant group of (continental) European economies experienced continued high (and even growing) rates of labour-shedding out of manufacturing over the late 1980s and the 1990s ('deindustrialisation') and, at the same time, a significant break in rates of employment absorption in the social services sector (ISIC 9: community, social, and personal services), a sector which now accounts for the highest share in total employment of all sectors. Both these two features cannot be found for the US (or the UK) and hence we argue that they contribute towards an explanation of the additional hikes in unemployment rates in (continental) European economies as against the US and the UK from the mid-1980s onwards. The analysis proceeds through a careful examination of changing sectoral employment patterns across different OECD economies and discusses reasons for inter-country differences in the time patterns of deindustrialisation and employment absorption in the different service sectors. We also discuss theoretical reasons why the overall unemployment situation should be affected by the characteristics and the speed of sectoral structural change. Further we suggest a theoretical model showing why the structural break in the relative employment absorption capacity of the welfare services sector might have taken place in the European economies due to changes in redistributional policies.

2 Theories of structural change and the unemployment problem

In this section we give a short overview of some theories of structural change which also imply dynamics in the structure of employment. Theories of structural change and economic growth have a long pedigree (going back to the classical contributions by Quesnay, Smith and Ricardo); however, they have scarcely been brought to bear more recently on the subject of macroeconomic unemployment.[2] On the other hand there is a more recent literature and applied research on 'structural unemployment' (see e.g. the well-known study by Davis et al. (1997)). These investigations explain unemployment mainly by rigidities in the labour market (e.g. wage inflexibility, skill-mismatches, low regional and/or sectoral mobility of workers, etc.). From our point of view this literature insufficiently specifies the structural change issues which cause the requirements for adjustment. The adjustment processes are investigated at the microeconomic level (across individual workers) whereas issues related to sectoral adjustments in the economy as a whole are mostly ignored. Further, the empirical studies are not at all conclusive as to the significance

[1]Financial support from the TSER project on 'Technology, Economic Integration and Social Cohesion' is gratefully acknowledged.

[2]However, see for example Aghion and Howitt (1998, ch. 4), where the issue of unemployment and growth in a Schumpeterian framework of endogenous growth is discussed.

of 'structural unemployment' and do not contribute substantially towards an explanation of the recent high levels of unemployment in Europe.

Thus we face a situation of 'double ignorance': The existing theories of longer-term structural change do not focus on the unemployment problem, and in the microeconomic literature on 'structural unemployment' the actual theme of structural change is not explicitly formulated.[3] In the following we shall address the issue of structural unemployment in the context of an analysis of sectoral uneven employment growth. This is in line with traditional theories of structural exonomic dynamics (see e.g. Pasinetti (1981) and Pasinetti (1993)). Structural shifts in sectoral employment patterns are - in our view - an important contributing factor to explain the recent unemployment experience in Europe and also contributes to an explanation of some of the differences in the employment experience of the US vs. Europe. This should, of course, not be seen as belittling the other problem of adjustments at the microeconomic level and, in fact, the two types of analysis should be seen as complementary.[4]

In Pasinetti's work some important issues are highlighted which we also see as crucial for modelling employment problems of structural change. This is, firstly, the introduction of structural change from the demand side by specifying non-linear Engel curves; secondly, uneven productivity advances in different sectors of the economy (a theme also elaborated in a number of contributions by Baumol and his associates (Baumol et al. (1985) and Baumol (1987)) which in turn affects the composition of output and particularly of employment in a dynamic economy; and, thirdly, the (potentially) arising effective demand problem in the course of structural adjustment to these two types of forces. We shall refer to each of these elements in the context of the more specific historical developments which confronted OECD economies in the 1980s and 1990s in the following sections of the paper.

2.1 The mechanics of sectoral labour shedding and labour absorption

In this section we present a simple accounting framework in which the European unemployment problem in the 80's and 90's can be addressed from a structural point of view.

Seen algebraically the potential for structural unemployment can be stated in a very sim-

[3] Of course, this is an oversimplified view which does not do fully justice to both these two strands of the literature, but we think that in essence this point can be made.

[4] The theoretical (and empirical) discussion which comes closest to the theme of unemployment due to structural change is the discussion on 'technological unemployment'. This topic was first addressed by David Ricardo in his chapter 'On Machinery' (Ricardo, 1881, ch. XXXI) where he investigates the impact of sudden (capital using) technological progress. In doing so he sets up the first model of (what was later called) 'traverse analysis' and highlighted the view of technological unemployment as (transitory) 'capital shortage unemployment'. This kind of unemployment was seen as a medium-term phenomen, until the capital stock had time to adjust. Ricardo's analysis gave rise to a lively set of contributions in the 1920's and 30's (particularly by members of the 'Kiel school' such as Burckhardt, Neisser, Lederer, Lowe, etc.; see Hagemann (1990), for an overview of these contributions). Later on two important theoretical contributions, one by Hicks (1973) and the other by Lowe (1976) again addressed this topic using rather different modelling techniques.

The spirit of these models is well reflected in a statement by Neisser: '... the capitalist process [is] a race between displacement of labour through technical progress and reabsorption of labour through accumulation ...; displacement and reabsorption are two largely independent factors, and it is impossible to predict the outcome of the race between the two on purely theoretical grounds.' (Neisser, 1942).

In the neoclassical literature the problem of unemployment as (partly) derived from major sectoral adjustment problems in the economy as a whole is hardly addressed at all: unemployment is seen as principally due to rigidities in the price/wage adjustment processes and to coordination problems in labour markets; these are modelled at the micro-economic level without any attention paid to major developmental patterns at the sectoral level (see e.g. the comprehensive treatment in Pissarides (1990)).

ple manner: Structural change (in the form of technological change, changes in the structure of demand in closed or open economies, environmental and policy constraints imposed on the structure of an economy) requires continued adjustment in the allocation of labour across sectors. Under the assumption of a stationary work force, workers which are shed in some sectors must be absorbed by other sectors which would guarantee full employment (if we start at the full employment level). With a growing work force (growing population or rising labour force participation) additional workers (or hours worked) must find employment in all sectors, but in effect they are mainly absorbed by a sub-set of (labour-absorbing) sectors.

'Structural unemployment' cannot arise if we assume frictionless shifting and absorption of workers (and hours supplied). Hence an analysis of these frictions has to be part of any theory of 'structural unemployment'; in our approach we emphasise that the analysis of such frictions has to specifically focus upon stock adjustment problems which arise in the (historical) context of sectoral growth (including technological and productivity) dynamics. In a nut-shell, there are two issues involved in 'matching' an available work-force to the existing structure of employment opportunities: (i) the two have to 'match' in terms of the structural (stock) characteristics of both the labour force (skill, demographic and geographical/mobility characteristics) and the potentially available jobs (their skill, motivational and geographic requirements); (ii) they also have to match in terms of the more traditional economic concept of the intersection of labour supply and labour demand curves, i.e. given the structural characteristics of workers and jobs there has to be a matching in terms of the wage/price regulating mechanisms in the labour (and product) markets. (i) and (ii) are obviously not independent as (ii) is defined in terms of (exogenously) given structural characteristics while (i) focusses upon these structural characteristics including their evolution over time. A 'structural' analysis of 'matching problems' in fact analyses how the structural characteristics of both sides of the labour market (labour force and employment opportunities) change over time. Matching problems may become more or less severe as the structural characteristics of the stocks of workers and of jobs change over time. There is also the other type of relationship between (i) and (ii): The same type of structural features of labour supply and employment opportunities can lead to greater or smaller matching problems of the (ii) type, depending upon the way how the more traditional mechanisms of the labour (and product) markets operate (degree of flexibility of wages; the shapes of the labour supply and labour demand schedules defined as a function of the real and product wage rates).

Changes in the structural characteristics of workers and jobs and evolving stock adjustment processes are thus a central part of the analysis of 'structural unemployment'. In general, one can argue that the type (i) matching problem is a function of the degree of structural change itself: if there is a fundamental change in the characteristics of the (potentially) available job opportunities, due e.g. to technological change, shifts in the structure of sectoral demand, etc., then the 'distance' in the characteristics of the available labour force and the structure of the demand from a new (compositionally different) set of employment opportunities is wide and hence the stock adjustment problem is large; big strains are going to be put on the type (ii) market mechanism to induce a matching process to avoid high 'structural unemployment'. Over time the type (ii) matching mechanism will induce stock adjustment processes so that the 'structural mismatch' might decline (e.g. a scarcity premium on skills might induce more skilling); however, the structural mismatch might also grow over time (e.g. unemployment effects on skill erosion and motivation loss). There is hence a clear time dimension to the structural mismatch problem induced by structural change (which, by the way, can also be initiated by compositional shifts in the labour supply e.g. a sudden inflow of immigrants). As a

working hypothesis, we shall maintain that the severity of shifts in the structural (compositional) characteristics in labour demand (or labour supply) increases the potential of type (i) mismatch and thus might go along with higher 'structural unemployment'. The degree to which such a 'structural mismatch' generates unemployment and sustains it over time depends - among other things - upon type (ii) matching mechanisms in labour and product markets.

In the course of structural changes and dynamics of employment patterns, a very important part is played by the entries and exits of workers. The entrants are mainly younger workers coming from the educational system, whereas exits are mainly from employment to retirement and withdrawals (temporarily or permanently) from the active labour force. The entry/exit dynamics is of course shaped by institutional (country-specific) settings (e.g. retirement systems, social security systems, etc.). At this point it is sufficient to mention that a great part of the mobility and flexibility at the micro level which is required by structural change is through the replacement of workers through entry and exit of workers.

As will be seen in the following sections of the paper, we shall focus on two particular features of structural change in employment structures in OECD economies over the 1980s and 1990s: The speed and severity of the process of labour shedding in the industrial sector ('deindustrialisation') and employment absorption in particular segments of the tertiary (service) sectors; as we shall see there are significant differences in the trajectories of the different economies (and particularly between the US and a sizable group of European economies) in these two respects. Within the service sector, a particularly important role is played in these US-Europe comparisons by what can be called the 'welfare services' sector (ISIC 9). This sector accounts for a sizable share of total employment in OECD economies and we shall see that the dynamics of employment absorption in this sector differed substantially between various groups of economies.

Let us shortly proceed to review the mechanics of the dynamics of labour absorption in different sectors which will be of use when we discuss the empirics of employment growth in tertiary activities in OECD economies in section 3. In principle, the ability of a sector i to absorb labour Δe_i is a function of two variables: the growth of output (dependent on demand) and the level and change of the employment coefficient (the inverse of labour productivity):

$$\Delta e_i = \left(\frac{e_i}{q_i}\right) \Delta q_i + \Delta \left(\frac{e_i}{q_i}\right) q_i$$

where e_i denotes employment and q_i denotes output in sector i. Hence a decomposition of sectoral employment growth into its various components shows that a particular sector's employment absorption capacity (i.e. the number of jobs or hours of work it generates over time) is a function of:

1. output growth exceeding (labour) productivity growth
2. a high labour intensity
3. its size (measured by its initial share in output or employment).

Historically, most major shifts in employment structures were characterised by a shift towards a sector which had - at least initially - high labour intensity (which was true for early manufacturing and later for the various tertiary activities) and also high growth of demand. As is well-known from elementary economics, the growth of demand depends upon two types of factors: (i) the shift of demand towards this sector at constant relative prices in response to income or wealth changes which is measured by the income elasticity, and (ii) the shift due to

the reaction of demand to changing relative prices; this reaction is measured by the elasticity of substitution. Relative price movements are in turn, over the longer-term, substantially affected by relative (total) factor productivity growth.

This gives us a number of categories of (potentially) labour absorbing sectors. Sectors with high income elasticities are potentially labour-absorbing if there are,

1.1 high productivity growth and high substitution elasticities (larger than one in absolute terms) or

1.2 slow productivity growth and low substitution elasticities (less than one).

In exceptional circumstances, sectors with only mediocre income elasticities (around one) can be substantial labour-absorbing sectors at a point of time when they account for a large share in overall employment and either:

2.1 relative productivity growth and substitution elasticities are very high or

2.2 relative (labour) productivity growth and substitution elasticities are rather low.

2.2 Constraints to labour absorption: the role of the welfare services sector

In this section we present a theoretical discussion concerning the employment absorption capacity of the welfare services sector and its potential constraints (see also Landesmann and Pichelmann (1998)).

With regard to the classification introduced at the end of the previous subsection, we shall make the argument that the welfare services sector falls at different times into categories 1.2 or 2.2: It is a sector which now accounts in all OECD countries for a substantial share in total employment of about 30-40 % (more than any other service sector; for evidence see section 3.1); estimates as to its income elasticity differ, but it includes sectors with very high income elasticities (education, health); it is a sector with low labour productivity growth and high employment intensity. As to substitution elasticities, we shall argue that there can be changes in regimes. In most OECD countries, but in Europe in particular, welfare services are to a substantial degree publically funded and the measurement of substitution elasticities involves how public spending programmes respond to the workings of Baumol's 'cost disease' (i.e. the fact that its productivity growth potential is very low). Our argument will substantially rely on emphasising the possibility of a regime switch in the implicit substitution elasticities driving the expenditure patterns in different OECD economies given the other parameters driving employment absorption in that sector (i.e. slow rate of productivity growth, high employment intensity, large size).

The data which we shall present in section 3 show the following stylized facts:

1. The employment absorption in the social services sector was particularly high in Europe in the 1970s and early 1980s (much higher than in the US). As compared to this, the US had much more balanced growth of employment across the whole range of service activities.

2. By the mid to late 1980s a significant number of European economies experienced a break in the rates of employment absorption of the welfare services sector; such a break is not visible for the US.

3. Furthermore, the break occurred at a time when a significant number of European economies continued to experience a persistent process of 'deindustrialisation' (labour shedding in the industrial sector) which - by then

4. had flattened considerably in the US.

In the following, we shall discuss a stylised model which explains the pattern of employment absorption in the welfare services sector in Europe described above. The following are the ingredients of such a model:

1. Welfare services suffer from Baumol's 'cost disease' problem; i.e. the scope for productivity growth is very low, especially in that there is consumer pressure for the 'quality' of services not to decline (this requires a particular ratio of nurses to patients, teachers to students, etc.)

2. An argument which applies to welfare services, but less so to other service activities which are also employment intensive (such as distributive trades, restaurants, hotels, etc.) is that a significant fall of the relative wages in that sector to counter the low productivity growth problem is not an option: the reason is that the sector requires a significant proportion of skilled and motivated employees to assure the (politically and socially) required 'quality standards'; a sharp drop in the relative wage rate will lead to a negative selection of job applicants and motivational problems in jobs in which job performance is not easy to monitor; employment in some other service areas (such as in distribution) rely much less on skilled labour and monitoring is easier.

3. Given that Baumol's cost disease works strongly in this sector due both to low labour productivity growth and a relative wage (efficiency) constraint, purchasers (and subsidisers) of that sector's output will have to bear the growing costs in terms of relative price (and subsidy) increases.

4. The above is true for both the US and Europe; let us now come to the differences: our stylised European model suggests a model in which a constraint was imposed on 'quality differentiation' in the provision of welfare services: roughly the same type of health service, schooling, old age provisions etc. was provided to all households; in the US there was much more scope for 'quality differentiation'. 'Quality differentiation' induces producers to absorb consumer rents which can be particularly exploited when income inequality is high. The US system is one with high income inequality and high 'quality differentiation' in the provision of welfare services and this provides a model of continuous expansion of (differentiated) output over time. In the European model, given that there is a constraint in terms of relative uniformity in quality in the provision of social services, growth of social services provision will have to rely on a different mechanism than in the US model. Since quality differentiation is constrained, it cannot rely on the exploitation of 'quality rents' through the provision of higher quality services to high income households. In fact, given the uniformity of quality provision, the suppliers will be faced by falling income elasticities for their (uniformly supplied) low/medium quality service at high levels of income. Instead, the European model will have to rely for its growth in the social services sector on some form of redistribution (this can take the form of direct income transfers to low income households or subsidisation of a certain proportion of the purchase price of social services, or direct cost subsidisation of the social service industries). This allows the group of low income households to move into a region of their demand schedules characterised by relatively high income elasticities and also allow a general increase in the (uniformly supplied) quality of the service product.

ISIC	Description	
1	Agriculture, hunting, foresting, and fishing	I
2	Mining and quarrying	II
3	Manufacturing	
4	Electricity, gas, and water	
5	Construction	
6	Wholesale and retail trade, restaurants and hotels	III
7	Transport, storage, and communication	
8	Financing, insurance, real estate, and business services	
9	Community, social, and personal serives	

Table 3.1: ISIC-classification

5. As the European model of welfare services provision relies on a redistributive mechanism outlined above (modelled for example as public subsidy to poorer households per unit of service provision), this leads also to a growing subsidy to GDP burden as a result of the Baumol's 'cost disease' dynamics (low labour productivity growth combined with an efficiency wage rigidity for welfare services employees). Once the increase in the subsidy to GDP ratio is stopped due to fiscal/political constraints, this growth mechanism in the European model collapses (for details, see the stylized model in Appendix A of this paper).

The above is a story which can provide an explanation for structural breaks in the employment absorption pattern of the welfare services sectors in continental Europe in the mid- to late-1980's; these breaks are clearly evident in an examination of the sectoral employment time series for a significant number of Continental European economies (see section 3.3). This, together with the continued process of deindustrialisation in a large number of continental European economies (lagged in comparison with the US and the UK), supplies the ingredients to interpret some of the hikes in the European unemployment figures in the late 1980s and the 1990s as 'structural unemployment'.

3 Empirical evidence

In this section we examine the different patterns of development and the courses of structural change in various European and non-European countries. We use the OECD Labour Force Statistics (LFS) to describe the employment patterns mainly for the period 1975 to 1994 (with exceptions for some countries due to data problems). Further we want to note that, first, we use without exception employment time series and no other data on variables such as output, price or productivity and, second, we also refrain in this section from using at this stage unemployment or demographic data which means that we do not refer to labour force participation rates across OECD economies or demographic developments. As mentioned in the introductory sections, our analysis stresses the importance of structural change in sectoral employment structures in OECD economies and their inter-country differences over the 1980s and 1990s; we introduce this factor into the current debate on European unemployment.

The labour force statistics is differentiated into 9 ISIC sectors (see Table 3.1). For some of the analysis below, we summed up the sectors at a more aggregate level, which we denote by I (agriculture), II (industry), and III (services), corresponding to the 'classical' sector scheme employed by Fourastié (1949) and Clark (1957). However, we shall quickly move on to argue that for explaining structural changes and especially unemployment issues in Europe one has to take a more differentiated look at the service sectors.

3.1 Description of employment patterns

The issue of structural employment change and its potential for explaining European unemployment will be discussed in five sections. *First*, we give a short description of the employment patterns along the three broadly defined 'classical' sectors I, II, and III. We argue that - in order to contribute towards a 'structural' explanation of Europe's recent unemployment experience - one has to take into account the potential for labour absorption by the service sectors (III) in relation to the labour shedding trends of the industrial and agricultural sectors (II and I). *Second*, we differentiate sector III; Sectors 6-9 defined above have different labour absorbing potentials, which depend on their shares in overall employment and their (relative) growth rates. Here we show that especially sector 9 (social services) is crucial, particularly in the European context. *Third*, we present an overview of development patterns of various countries. The various countries experienced similar patterns of development but at various times (i.e. the phasing of labour shedding and labour absorption across sectors differed). And *fourth*, we show by econometric means that in most European countries - as opposed to the non-European countries - there was a break in labour absorption in sector 9 sometime in the period 1980-1990. We also test for evidence of a prolongued and/or delayed process of deindustrialisation in continental Europe (relative to the UK and the US). These two factors - we shall argue - contribute towards an explanation of the high levels of unemployment in European countries. *Fifth*, we use this argumentation to explain cross-country differences in changes in unemployment rates (see section 4).

3.1.1 Broad sectoral employment shifts

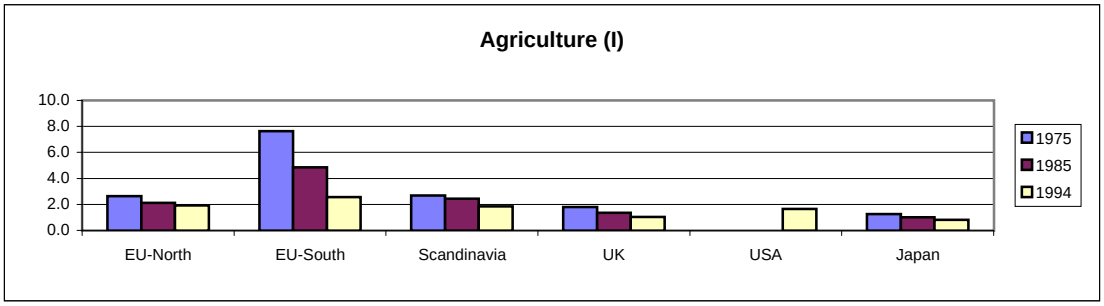
In this section we want to discuss shortly the development of employment patterns in sectors I, II, and III across the OECD economies. Of course, the general pattern and evolution of employment shares in these broadly defined sectors is well known and we shall only highlight the general development and some differences between groups of countries in a brief manner.

Figure 3.1 shows the shares of employment in these three broadly defined sectors for certain groups of countries in 1975, 1985 and 1994.[5] The groups of countries identified are the northern and southern EU-countries, the Scandinavian countries,[6] the US, the UK and Japan. Panel A of Figure 3.1 shows the employment shares in agriculture (I) which in most countries are now below 5 %. Further, countries with relatively high shares in agricultural employment in 1975 (mainly the countries of EU-South) experienced a tremendous decline in these shares over the last 20 years and are converging rapidly to the average level of about 4 to 5 %. This is especially true for the Southern European countries (especially Portugal, Spain and Italy and - to a much lesser extent - Greece) and also Iceland (sector I includes also fisheries) but at a less rapid pace. The largest decline in the share of agricultural employment was in Turkey from 20 % in 1975 to 5 % in 1994.

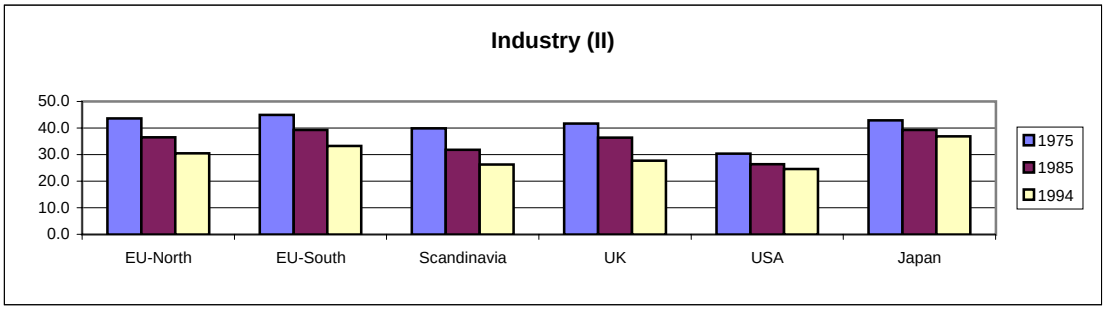
The industrial sector (II) (see Panel B) has more or less steadily (see below) declined in all countries from a share of about 45 to 50 % to less than 30 % in 1994. But there are two remarkable exceptions: In Japan, the share of employment in industry is declining very slowly and has reached about 38 % in 1994. The other exception is again Turkey. In this country

[5] Please note that in the Panels A-C of Figure 3.1 the y-axes are not equally dimensioned.

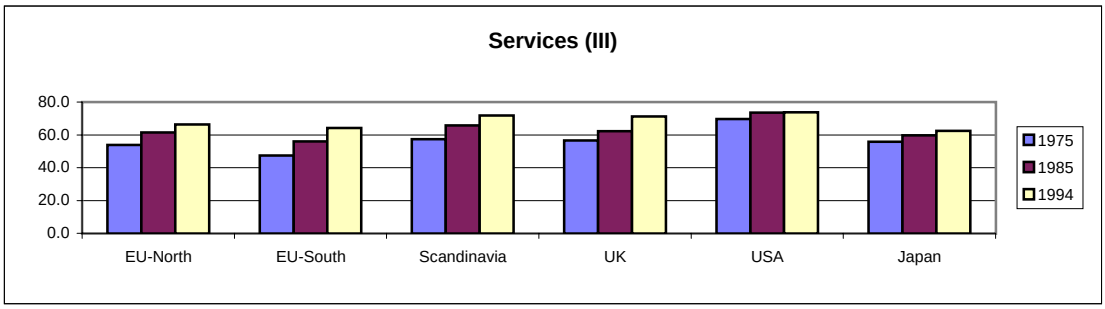
[6] For the EU-North, EU-South and Scandinavia the average of shares are presented. EU-North consists of Austria, Belgium, Germany (if available), Denmark, France, Italy and Netherlands; EU-South includes Greece, Ireland, Portugal and Spain and the Scandinavian countries are Finland, Norway and Sweden.



Panel A



Panel B



Panel C

Figure 3.1: Shares in sectors I, II, and III

the employment share in industry rose from 30 to about 45 %. With respect to sector II the Southern European countries did not look that different, neither in its shares in 1975 (which were only slightly higher) nor in its general pattern of development. Hence these countries faced, in addition to shrinking agricultural employment, also a strong process of deindustrialisation, more or less in line with the more advanced EU economies. Below, we shall look closer at the time patterns of the process of deindustrialisation for different countries (see section 3.2).

Generally, most countries experienced huge changes in their employment patterns over the period 1975 to 1994 with at times dramatic declines in sectors which formerly accounted for a sizable proportion of total employment.

Panel C of Figure 3.1 shows the great (and growing) importance of the service sectors for employment. In most countries nowadays more than 50 % and up to more than 70 % of the employed persons work in services. In this sense, the service sector was, over this period of time and at this broad level of aggregation, the employment-absorbing sector as was the industrial sector in the period of the First Industrial Revolution.[7] Seemingly, the non-European countries (with the exception of Japan) started from a higher share of this sector in 1975, but experienced a slower growth after that. Especially the US already had a share of 70 % in 1975 which rose only slightly to a share of about 75 %. The Southern European countries are still lagging somewhat behind the average share, as they started from a lower level, but experienced also large shifts of employment towards services.

In fact, a general trend towards convergence in the sectoral employment shares can be depicted from these figures, i.e all countries converged to a share of less than 5 % in agriculture, about 60-70 % in services and about 30 % in the industrial sector, although some countries are still lagging behind. The above description supplies some motivation that a serious discussion of employment and unemployment performances of different economies would have to include an analysis of the pattern of employment absorption capacities of the service sectors together with an analysis of the phasing and severity of labour shedding in industry and, for some countries, in agriculture.

3.1.2 Deindustrialisation and tertiarisation

Making use of the sectoral disaggregation introduced above (see Table 3.1 above) we can take a closer look at sectors II (industry) and III (services). Within industry, sector 3 (manufacturing) is the most important, accounting for about 30 % of total employment in 1975 and experienced in most cases the highest (negative) shifts in employment shares over the period 1975 to 1994 (see Figure 3.2). Given these two facts, the labour shedding processes in absolute values were mainly due to developments in this sector. This may also explain why this sector was very much in the center of discussion about the high unemployment rates in Europe, especially in the 1980s (see e.g. Rowthorn and Wells (1987)). Starting from a share of more than 30 % (of total employment) in almost all countries in 1975 it declined to about 20 % with some country differences; the US declined from about 25 % in 1975 to 18 % in 1994. The exception is Turkey which is the only country experiencing a positive shift towards this sector. Amongst the non-European countries - which generally have a lower share of employment in this sector than the European countries - only Japan has an employment share of more than 25 % in 1994 as opposed to about 15 to 20 % in the other non-European countries.

[7] This shift is partly due to a reclassification of certain activities formerly undertaken within manufacturing, and partly due to increased outsourcing of service type of activities (e.g. marketing, advertising, accounting, etc.).

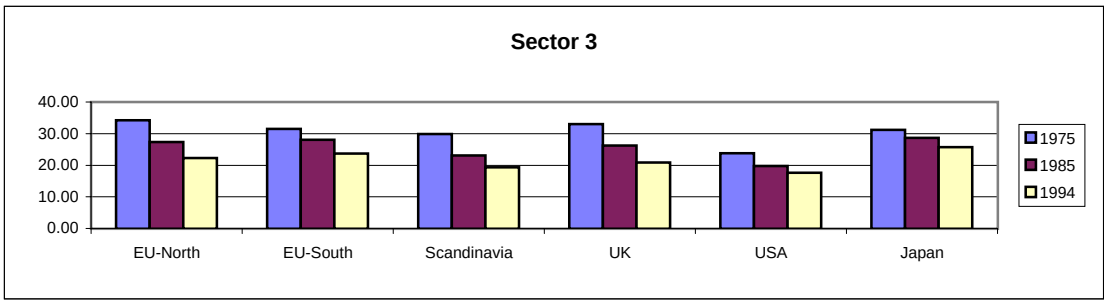


Figure 3.2: Employment shares in manufacturing (sector 3)

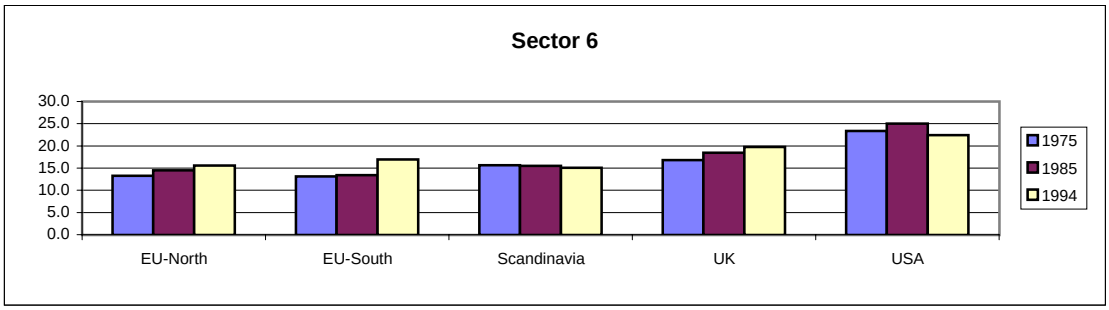
Labour shedding trends in manufacturing is only one side of the analysis of the impact of structural change on unemployment. The other side has to do with the labour absorption capacity of other sectors. As we have seen above, the labour absorbing sectors were the service sectors included in III. Here we want to differentiate between the various service sectors 6-9 (see Table 3.1 above). Figure 3.3 shows the shares in 1975, 1985 and 1994. The general pattern is that employment shares are highest in sectors 6 and 9 but are growing very rapidly mainly in sector 8, although from a very low level. With regard to sector 6, the striking difference between the European and the non-European countries is that the shares are about 15 to 20 % in 1994 in the European economies (with even lower levels in Belgium, Italy, Sweden and Turkey) as against shares of about 25 % in the non-European countries. Sector 7 shows more or less constant shares in total employment with declining trends in those countries in which the share of employment was already relatively high compared to other countries. Thus, sector 7 seems to experience a convergence to shares of about 6 to 8 % in almost all countries. Employment shares in sector 8 are growing rapidly (but starting from a low absolute level) and there is a more differentiated development across countries. From an aggregate employment perspective sector 9 is the most important, as this sector has the relatively highest employment share within services and has experienced also rapid growth in employment levels.

3.2 Dynamic patterns of structural change

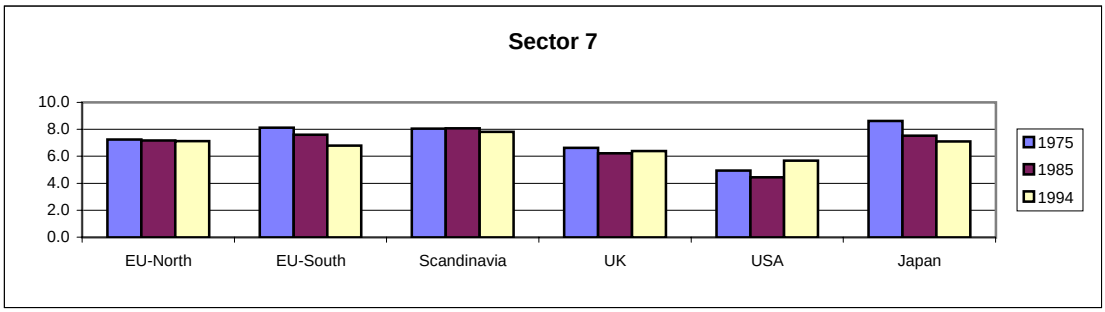
3.2.1 General discussion

We turn now to examine the time pattern of structural change in different countries, which we started to discuss above. We do not give an exhaustive description, but only want to distinguish some 'typical' patterns in European as opposed to some non-European countries. Different patterns of structural change can be distinguished at three levels. *First*, countries can experience equal or at least similar patterns but at different times (see e.g. Chenery and Syrquin (1975)), *second*, countries experience also different patterns of structural change (or development), but the countries converge to a similar structural pattern, and, *third*, countries experience totally different development patterns.

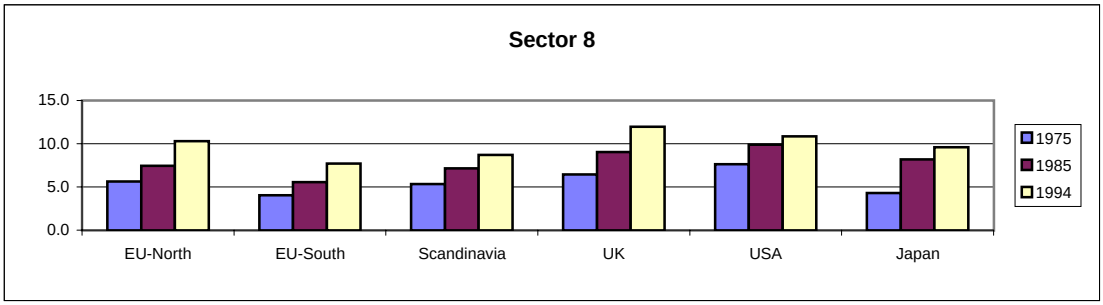
The first variety means that countries experience the same pattern of structural change, but at different times (i.e. the time trajectories are equal, but shifted on the time dimension). The second variety is best illustrated by an example: Some countries are experiencing a process of deagrarianisation and tertiarisation without ever having been industrialised to the extent of other countries (due to different trade structures, technological paradigms, etc.); but the



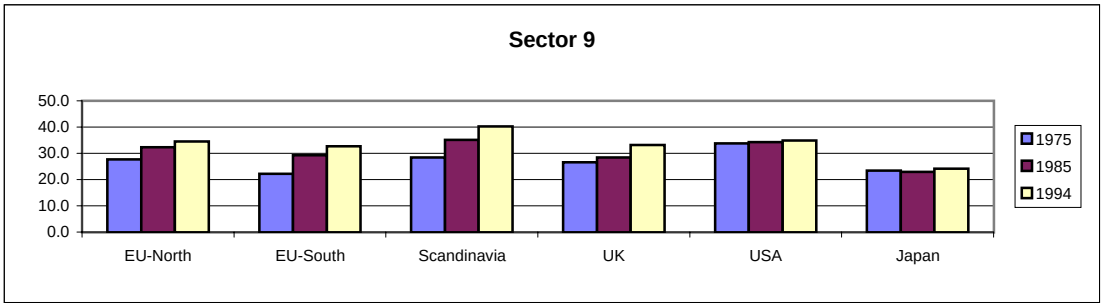
Panel A



Panel B



Panel C



Panel D

Figure 3.3: Employment shares in services (sectors 6-9)

actual structural employment patterns are converging to those of the other (more advanced) countries. In terms of trajectories, this means that the time trajectories are different, but 'end' in a similar structural pattern. Thirdly, some countries may remain agrarian economies for a long time, thus showing a different economic structure initially and are also not able to develop a structure converging to that of more advanced economies.[8] Reasons for this could be that they are naturally resource endowed (e.g. oil economies, fisheries).

Although this third possibility can be true for developing (or transition) economies, we think that the countries in our sample are best described by the first and second type of pattern. I.e. the countries show a (more or less) similar pattern of development and structural change, as can be seen e.g. from the converging patterns of employment structures discussed above, but the trajectories might occur at different times. Of course, the patterns are not exactly replicated, as countries have different institutions, different endowments/and or other reasons for distinct specialisation and trade structures. Furthermore, as we are thinking of employment rather than output shares, we also have to take into account that countries may have different sectoral relative productivity levels.[9]

3.2.2 Description of actual patterns

In this section we examine the dynamics of structural change in employment in the OECD economies over the last twenty years. In particular, we take a closer look at *changes in the dynamics of structural change* in sectors 3 and the service sectors 6-9. For some countries (the Southern European countries) we also consider the decline of employment in sector 1 (agriculture) as for these countries there was a huge decline of employment in this sector which increases the pressure on the overall employment situation. As we have seen above, in most countries sector 3 and for some countries also sector 1 are the most important labour shedding sectors and sectors 6-9 (especially 6 and 9) are in general the most important labour absorbing sectors.

In the following we give a short description of the changing dynamics of structural change, as these dynamics are obviously not smooth processes. We show in particular that the labour shedding and labour absorption pattern of the sectors is varying in time and across countries. In this section we rely on some descriptive statistics. In section 3.3 we shall present the results of an econometric investigation of structural breaks in employment shedding and employment absorption in sectors 3 and 9 respectively. We consider this to be a link in the understanding of the different unemployment performances between European countries and the US which has not received sufficient attention in the discussion so far.

In order to provide a descriptive overview, we divide the period 1975 to 1994 into four subperiods, 1975-1979, 1979-1984, 1984-1989 and 1989-1994. These subperiods correspond more or less to the peaks in the growth cycles. Of course, the peaks differ from country to country but this general time structure should suffice for the preliminary overview given here.[10]

To highlight the differences between sectors, countries and periods we constructed the following indicator: First, we calculated the (exponential) growth rate g_j^c of total employment e_t^c

[8] Of course this can also be seen as a question of the appropriate length of the time horizon of the analysis.

[9] For an analytical example of different trajectories see e.g. Rowthorn and Wells (1987).

[10] We have to note here, that the indicator we use in this section depends on the choice of beginning and ending of the subperiods.

for each country c and each of the four subperiods $j = 1 \ldots 4$:

$$g_j^c = \frac{\ln\left(\frac{e^c_{T_j}}{e^c_{0_j}}\right)}{T_j}$$

0_j and T_j denotes the first and last year of the subperiod under consideration, respectively. Then we worked out a hypothetical sectoral development under the assumption that employment in each sector had grown with the rate of growth of total employment (which amounts to maintaining a constant share in total employment). The hypothetical employment path is thus based on the assumption of even sectoral development: the rate of (labour-saving) technological progress and the rate of demand growth is equal in each sector leading to balanced sectoral employment growth. Thus, the hypothetical trajectory of sectoral employment is calculated as:

$$\tilde{e}^c_{i,t_j} = e^c_{i,0_j} \exp^{g^c_j t_j}$$

Third, we substract the employment levels on the hypothetical path from the actual ones to get the deviation from the hypothetical path and express it as a percentage of the (inital) employment level of sector i at time $t_j = 0$:

$$\Delta^c_{i,t_j} = \frac{\left(e^c_{i,t_j} - \tilde{e}^c_{i,t_j}\right) 100}{e^c_{i,0_j}}$$

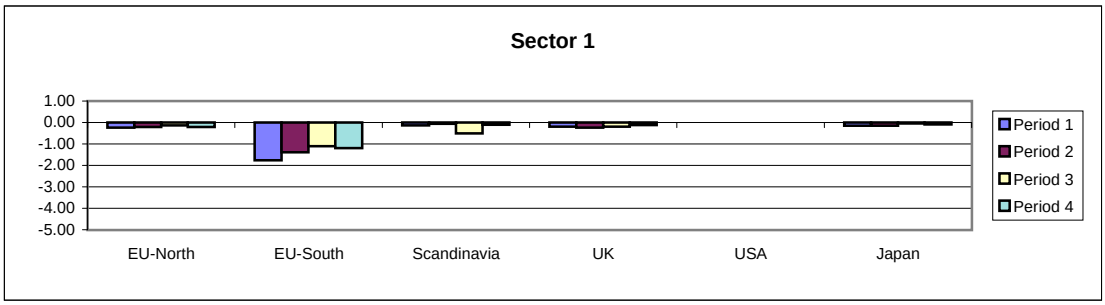
This exercise was done for each of the 20 countries.[11] In Appendix B (Figures B.1 and B.2 and Table B.1) the percentages are listed for sectors 1, 3, and 6-9 always for the last year of each of the four subperiods, i.e. T_j and for each country. If this indicator equals 0, then the employment growth of sector i would have been equal to the total employment growth; values lower (higher) than 0 thus mean a lower (higher) growth than overall employment growth. Further the height of the bars gives a hint of the importance of the sectors in its labour shedding and labour absorbing performance in relation to total employment growth.

Next we discuss some of the striking features of the changes in the dynamics of structural change for some subgroups of countries. Figure 3.4 shows the pattern for the labour shedding sectors 1 (Panel A) and 3 (Panel B). As one can see, sector 1 (agriculture) is for all subgroups of countries a relatively labour shedding sector.[12] The values observable are, however, very small. The exceptions are of course the Southern European countries where there was a dramatic decline in the employment share of this sector (see above). In comparison to sector 3 the values are smaller in almost all country groups (exceptions are the EU-South countries). This indicates that the relative labour shedding in sector 3 (manufacturing) was much more important overall.

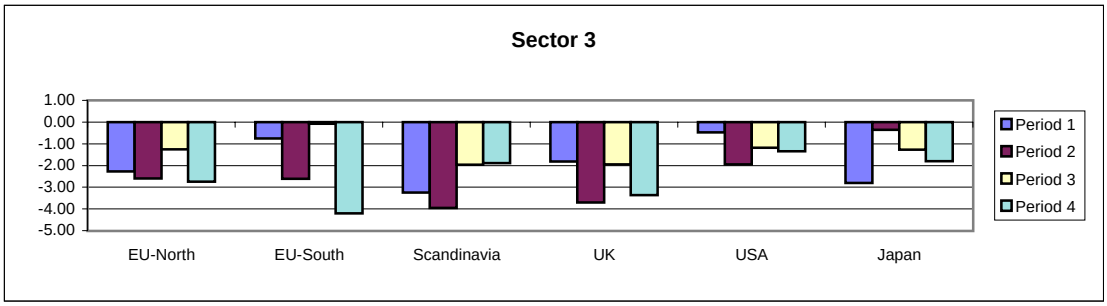
Turning to the manufacturing sector (sector 3), we want to stress two facts: First there is a difference between the European countries and the US, with the US having in general lower relative labour shedding rates in this sector. Second, the EU-Northern countries show a rather constant higher rate of deindustrialisation with a temporary dip in the third subperiod followed by a speeding up of the process of deindustrialisation again in the fourth period. In the Scandinavian countries, there were very high rates of deindustrialisation over the first two periods,

[11] Due to data problems the subperiods for Turkey were 1975-1980, 1980-1985, 1985-1989 and 1989-1994 and for the US the last two subperiods were 1985-1990 and 1990-1994.

[12] No data available for US.



Panel A



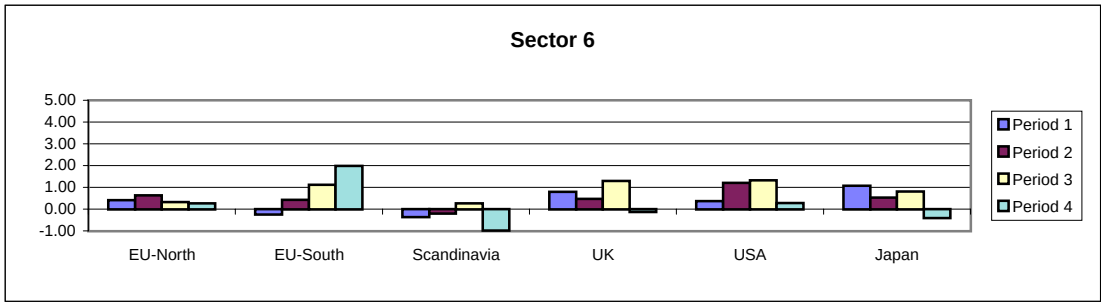
Panel B

Figure 3.4: Dynamics of change: sector 1 and 3

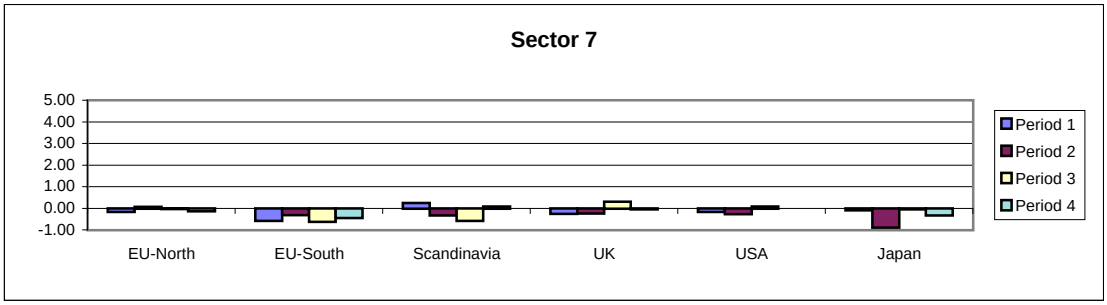
followed by some decline in the two last subperiods. The Southern European countries experienced a very high rate of deindustrialisation in the last period (in addition to the labour shedding in agriculture). In Japan there is also some evidence for a speeding up of deindustrialisation over the last three periods (but at lower relative rates than in EU-North). This points towards a prolonged (and even speeding up) experience of deindustrialisation in a range of European economies (and Japan) which is not found in the USA.

Next we turn to the labour absorbing sectors. Figure 3.5 depicts the pattern of structural change in the service sectors. To highlight also the differences in the importance of the sectors we dimensioned the y-axes identically. In comparing the sectors it can be seen that the values for sector 7 (transport, storage and communication) are very low, so that this sector is not very important for the discussion of relative labour absorption and labour shedding.

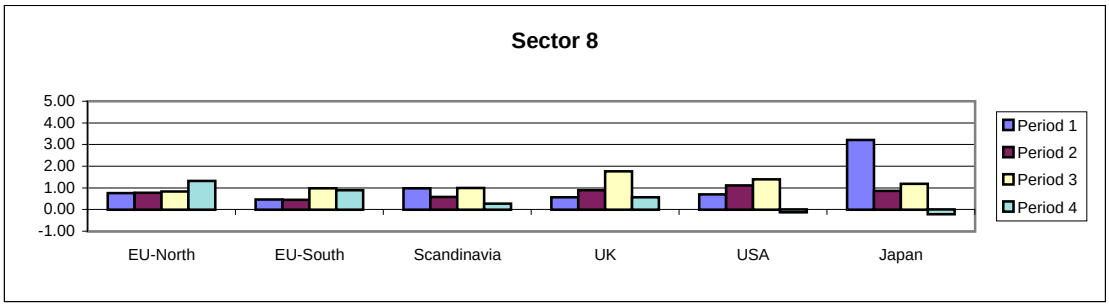
Further sector 8 (financing, insurance real estate, and business services) - although it is an expanding sector with high rates of employment growth its contribution to overall labour absorption is affected by its relatively small initial share. It performs rather differently across the country groups with an earlier speeding up of relative employment growth in that sector in the US and the UK as compared to EU-Northern and EU-Southern economies; the sector became relatively more expansive in EU-North and EU-South over the last 10 years, while it was declining (although it remained labour absorbing) in Scandinavia and especially in Japan (slightly negative over the last period). Given the relatively greater weight of this sector in the US and UK economies (see section 3.1 above), the sector was overall most employment absorbing in the UK and US over the period as a whole, but experienced lower rates of relative employment growth in the last subperiod, with even a negative rate differential for the US.



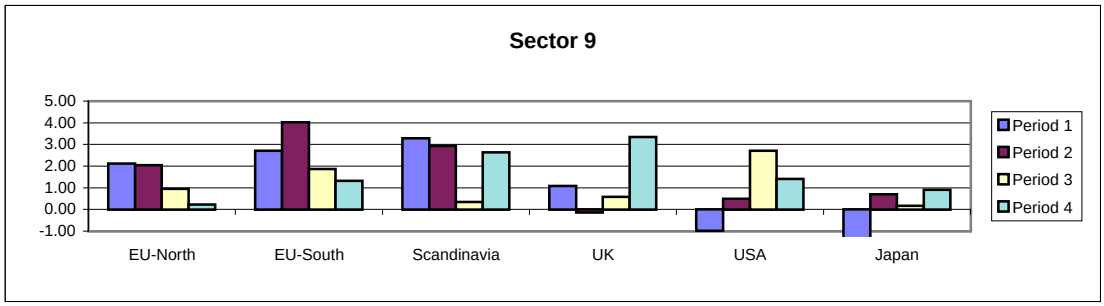
Panel A



Panel B



Panel C



Panel D

Figure 3.5: Dynamics of change: sector 6-9

There remain two sectors with a potential for labour absorption on a scale which could counteract the labour shedding from the manufacturing sector. The first of them, sector 6 (wholesale and retail trade, restaurants and hotels), was very much discussed in the job-miracle debate in the US. And indeed, one sees a much higher (and even growing) rate of relative labour absorption in the US and the UK as opposed to Scandinavia and EU-North. But there was again a decline in the last subperiod in the UK and the US. Japan also experienced a high rate of relative labour absorption over the earlier periods, but it was declining and became even negative (relatively labour shedding) over the period 1989-1994. Only in the EU-South countries labour absorption in sector 6 proceeded at very high rates. This is most certainly the result of the convergence process discussed earlier on, as these countries started with an underrepresentation of this sector (see the graphics of shares in section 3.1 above) and hence relative employment growth in this sector represents a catching-up process.

There remains sector 9 (community, social, and personal services) as a vital sector for employment absorption. As mentioned above, this sector is also the most important potential labour absorbing sector as it has the highest share in total employment of all the service sectors (see above) and the potential for productivity growth is low. From the diagrams, we can see that the bars of the diagramms for sectors 3 and 9 have more or less the same height in absolute terms (2 to 3 % on average), with opposite signs. As to inter-country variations we can see here a crucial difference: In the EU-North and EU-South countries the rates of relative employment absorption in sector 9 are initially much greater then in the US but are declining, whereas the rates of labour shedding in sector 3 remain constant or are speeding up (see discussion above). In Scandinivia the situation is better as the rate of relative labour shedding declines in sector 3 but from a very high level. In the UK and the US, on the other hand, we observe high and/or growing relative labour absorption rates in sector 9 over the last two sub-periods. Japan faces a situation like Europe with growing rates of relative labour shedding in manufacturing combined with very low rates of relative labour absorption in sector 9.

3.3 Empirical evidence of structural breaks

In this section we present econometric evidence of the occurrence of structural breaks in relative employment growth of sectors 3 and 9. We looked for statistically significant breaks in the growth rates of the shares of these two important sectors (manufacturing and welfare services) in total employment.[13]

The main problem was first to find the year(s) in which a structural break has occurred if at all. For this purpose we applied some tests of structural breaks. In fact, we used the CUSUM, the CUSUM-SQUARE and the Chow-Test. These tests give some hint if a break has occured at all and the first and third test indicates also the year in which this has probably occurred. The problem is that for a number of reasons these tests (sometimes) produce different results.[14] By inspection of the log-linearised time series one can also detect the years of the suspected breaks, although these have to be tested econometrically afterwards.[15]

In a second step we then estimated piecewise linear regression functions (spline regression functions) for the diverse time periods for each country. These regressions yield values for the

[13] We do not report here the results for the absolute levels of the employment series, which are qualitatively more or less similar.

[14] For a discussion of the various tests see Hackl (1989) and Johnston and Dinardo (1997).

[15] One could also take some political events (elections, EU) or international treaties (e.g. Maastricht treaty, ...) as indicators for such breaks.

different growth rates over the time periods and can further be used to test significance on differences in growth rates.

In the data sample we included 17 countries[16] (14 European and 3 Non-European countries) and the employment data over the period 1975-1994.

In the following we only present the results of the spline regressions and some test statistics.

3.3.1 Structural breaks in relative employment growth/contraction in manufacturing

Table 3.2 below shows the results for changes in the growth rates of the employment shares of the manufacturing sector for the 17 countries. The values labeled $d1$, $d2$, and $d3$ are the estimation coefficients for the dummy-variables.[17] The values below these cofficients give the t-statistics. If there is no value inserted in $d2$ or $d3$ this means that we did not find a structural break. Below these values, the $F - statistic$ for the first and (eventually) second structural break are listed. The lines labeled $GR1$, $GR2$, and $GR3$ then give the growth rates of the shares in the subperiods. The years separating these subperiods are listed in rows 'Break 1' or 'Break 2'. The last three lines give the overall test statistics of the regression.

The results are in line with the hypothesis stated above. We find significantly lower growth rates (higher negative growth rates) in the second subperiod (i.e. the period after the first break) for Austria, Finland, France, Netherlands, Sweden, Spain, Iceland and Portugal. In Austria, France, the Netherlands, Sweden and Portugal these breaks occurred at the end of the 1980's or beginning of the 1990's, which is in line with our thesis of delayed deindustrialisation. In the Netherlands and Sweden we see two phases of deindustrialisation. For Belgium, Norway, Denmark, Ireland and Italy there is evidence for a slowing down of deindustrialisation. Further, for Great Britain, the US, Australia and Japan we did not find evidence for a structural break over this period.

3.3.2 Structural breaks in the welfare services sector

The same procedures were used to test for structural breaks in relative employment absorption in the welfare services sector (sector 9). Again, we find support for our hypothesis above for most of the countries. In most European countries - exceptions are Finland, Great Britain, and Iceland - we found a significant decrease of the relative growth rates in the 1980's. Only Great Britain shows a significantly higher growth rate from 1989 onwards. Norway and Sweden experienced a lower relative growth rate from 1984 to 1989. For the non-European countries we did not find empirical evidence for structural breaks.[18] Table 3.3 summarizes the results of the spline regressions for sector 9:

3.3.3 Summary

These results can be summarized by a matrix indicating whether there was a significant decrease ($\downarrow$) or increase ($\uparrow$) in the relative growth rates of employment shares of sectors 3 and 9 (see Table

[16] Unfortunately we had to exclude some of the countries because of data problems. The most important ones are Germany and Canada and further Turkey and New Zealand. For some countries we had to include some missing values for one missing year. Although this could of course influence the results we do not believe that the general pattern would change.

[17] The spline regressions can be implemented as dummy-variable approach; on this see Johnston (1987) .

[18] Due to data problems we had to exclude Australia from the data sample.

Country	AUT	BEL	DNK	FIN	FRA	GBR	IRL	NLD	NOR	SWE
d1	-0.009	-0.024	-0.024	-0.011	-0.022	-0.023	-0.016	-0.031	-0.032	-0.034
	-8.912	-19.841	-8.243	-2.657	-50.334	-24.853	-8.722	-13.038	-27.339	-11.777
d2	-0.034	0.011	0.018	-0.019	-0.011		0.011	0.023	0.023	0.028
	-6.569	3.643	4.060	-3.600	-8.046		3.626	5.497	3.905	6.249
d3								-0.015		-0.028
								-2.909		-6.297
F-test 1	43.545	13.270	16.484	12.956	64.733		13.145	30.220	15.247	39.044
F-test 2								8.463		39.652
GR1	-0.90	-2.37	-2.35	-1.08	-2.20	-2.30	-1.61	-3.12	-3.18	-3.36
GR2	-4.32	-1.25	-0.59	-2.95	-3.30		-0.48	-0.87	-0.84	-0.56
GR3								-2.39		-3.38
Break 1	1991	1988	1984	1982	1989		1985	1983	1991	1982
Break 2								1990		1989
$\mathbf{R^2}$	0.954	0.980	0.906	0.97	0.998	0.972	0.913	0.979	0.985	0.981
$\mathbf{R^2}$**adj.**	0.949	0.978	0.895	0.967	0.998	0.97	0.903	0.975	0.983	0.978
F – value	177.306	423.408	81.814	275.579	3929.016	617.672	89.637	243.475	549.966	279.739

Country	ESP	GRC	ISL	ITA	PRT	USA	AUS	JPN
d1	-0.013	-0.007	-0.030	-0.021	-0.005	-0.019	-0.027	-0.008
	-6.818	-4.777	3.052	-8.941	-2.843	-15.575	-29.21	-11.793
d2	-0.011	-0.064	-0.058	0.011	-0.014			
	-3.609	-8.516	-5.300	2.782	-3.790			
d3								
F-test 1	13.023	72.518	28.088	7.737	14.36			
F-test 2								
GR1	-1.35	-0.69	-2.96	-2.11	-0.49	-1.91	-2.69	-0.75
GR2	-2.43	-0.75	-8.76	-1.00	-1.91			
GR3								
Break 1	1984	1990	1980	1985	1987			
Break 2								
$\mathbf{R^2}$	0.979	0.939	0.922	0.934	0.895	0.931	0.979	0.885
$\mathbf{R^2}$**adj.**	0.976	0.932	0.913	0.926	0.883	0.927	0.978	0.879
F – value	387.887	131.734	101.102	119.737	72.474	242.582	853.232	139.07

Table 3.2: Results of spline regressions: sector 3

3.4).

Thus most European countries can be found in the group of countries, where the relative growth rates in both sectors declined, i.e. rising labour shedding in the manufacturing sector and a weakening of labour absorption in the welfare services sector. In three countries (Denmark, Belgium, and Italy) labour absorption of sector 9 decreased but labour shedding in manufacturing also decreased. Finally, only in Great Britain relative labour absorption in sector 9 did increase which, however, followed a period of negative relative labour absorption in that sector over the period 1979-84 (see section 3.2 above), whereas the relative rate of employment decline in the manufacturing sector remained constant. Finland and Iceland experienced a higher rate of deindustrialisation but no significant decrease in the relative labour absorption in sector 9.

Sweden and Norway show another pattern. There was a simultaneous decline in the rate of deindustrialisation and a decrease in the relative rate of employment absorption in sector 9 from 1984 to 1989; from 1989 onwards deindustrialisation speeded up again (at least in Sweden) together with an increasing labour absorption in the welfare services sector.

Further, for the US and Japan the relative growth rates stayed constant over the period (but there remain substantial differences in the structure of employment between the two countries, as mentioned above).

Country	AUT	BEL	DNK	FIN	FRA	GBR	IRL	NLD	NOR	SWE
d1	0.013	0.034	0.019	0.021	0.022	0.005	0.018	0.010	0.026	0.022
	12.008	27.597	6.955	29.652	17.349	2.834	12.219	10.991	16.902	16.869
d2	-0.010	-0.028	-0.025		-0.018	0.014	-0.016	-0.009	-0.025	-0.022
	-3.494	-16.569	-6.237		-6.462	2.784	-3.537	-2.551	-7.252	-8.217
d3									0.023	0.021
									5.831	5.925
F-test 1	12.205	274.531	38.904		41.751	7.750	12.507	6.507	52.597	67.519
F-test 2									36.002	35.102
GR1	1.28	3.40	1.86	2.12	2.17	0.47	1.77	1.01	2.59	2.23
GR2	0.32	0.57	-0.67		0.40	1.89	0.18	0.10	0.12	0.05
GR3									2.46	2.19
Break 1	1988	1983	1984		1987	1989	1989	1990	1984	1984
Break 2									1989	1989
$\mathbf{R^2}$	0.938	0.990	0.742	0.980	0.970	0.800	0.932	0.914	0.986	0.982
$\mathbf{R^2}$ **adj.**	0.931	0.989	0.711	0.979	0.966	0.777	0.924	0.903	0.983	0.979
F – value	129.109	844.354	24.378	879.238	271.638	34.037	116.421	89.884	365.766	293.642

Country	ESP	GRC	ISL	ITA	PRT	USA	JPN
d1	0.038	0.026	0.018	0.027	0.038	0.003	0.005
	14.375	15.409	19.825	15.384	16.479	4.398	4.778
d2	-0.029	-0.012		-0.015	-0.028		
	-5.019	-2.764		-5.228	-8.106		
d3							
F-test 1	25.187	7.640		27.330	65.714		
F-test 2							
GR1	3.85	2.58	1.79	2.67	3.78	0.29	0.47
GR2	0.91	1.39		1.14	0.95		
GR3							
Break 1	1987	1988		1985	1983		
Break 2							
$\mathbf{R^2}$	0.958	0.968	0.956	0.975	0.975	0.518	0.559
$\mathbf{R^2}$ **adj.**	0.953	0.964	0.958	0.972	0.972	0.491	0.535
F – value	194.858	257.200	393.015	332.250	327.528	19.338	22.831

Table 3.3: Results of spline regressions: sector 9

4 Sectoral restructuring and unemployment performance

So far we did not use any unemployment data, as we referred mainly to the demand side of structural change processes. In this section we use unemployment rates (again from the LFS statistics) and compare these with the rates of structural change.[19] We present some simple regression results to show how the restructuring processes, i.e. deindustrialisation and tertiarisation, are connected to the (un)employment performance of different samples of countries. Figure 4.1 shows the unemployment rates in 1975, 1985 and 1994 for 20 countries. The impact of deindustrialisation on unemployment over the period 1973-1985 is well documented in Rowthorn and Glyn (1990) where they conclude that changes in the growth rates of industrial employment (i.e. the extent and speed of 'deindustrialisation') are an important explanatory factor for differences in the unemployment experiences across OECD countries (a better predictor than the

[19]For this analysis we express the shares of people employed in the sectors 1-9 and of unemployed persons relative to the total labour force (i.e. employed plus unemployed persons; not included are self-employed and unpaid family workers), i.e. $s_i^c = \frac{e_i^c}{\sum_i e_i^c + e_u^c}$ with $i = 1 \ldots 9$ where e_i^c denotes the level of employment in sectors i in country c, and e_u^c the number of unemployed persons. s_i^c thus denotes the employment rates in sector i and s_u^c the unemployment rate.

		Sector 3		
		↓	No break	↑
Sector 9	↓	AUT, FRA, IRL, NLD, ESP, PRT, GRC		DNK, BEL, ITA
	No break	FIN, ISL	USA, JAP	
	↑	SWE	GBR	NOR

Table 3.4: Summary of spline regressions

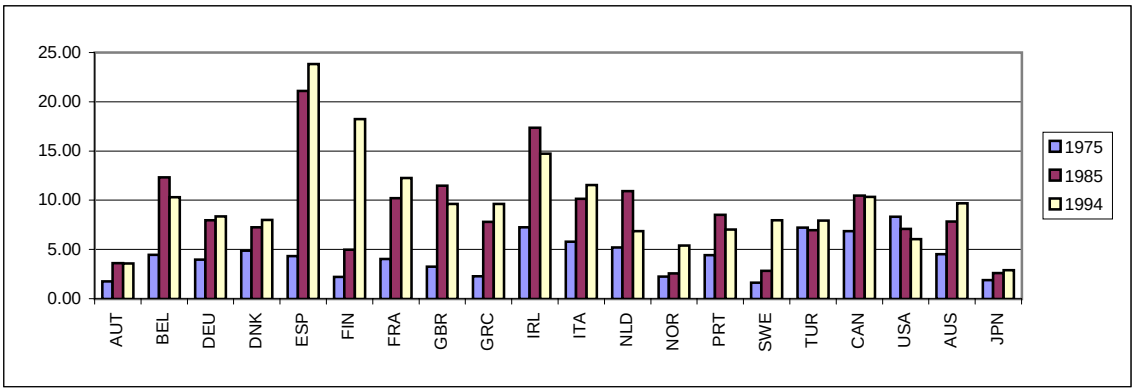


Figure 4.1: Unemployment rates

growth of total employment). This analysis hence showed that the rise in unemployment since 1973 has a strongly structural character.

Here we want to emphasize this aspect once again, but add further the absorption capacities of the services sectors, especially of the social and community sector (ISIC 9), the distribution sector (ISIC 6), and the finance and business services sector (ISIC 8). Thus we include employment developments in sectors 3 (manufacturing), 6, 8, and 9. Sector 3 has - as already mentioned - a large influence on unemployment as it is the main labour-shedding sector, sector 6 has played a vital role in the US and some other countries in the phase of deindustrialisation as labour absorbing sector, sector 8 experiences the highest growth rates in employment and sector 9 is the sector which, as has been argued above, might have had different characteristics in the US and continental European countries as a labour absorbing sector.

In the following we report some regression results which attempt to explain changes in the rates of unemployment across OECD economies over the period 1975-1985 and 1985-1994 through the employment growth rates of the different labour shedding and labour absorbing sectors. We thereby want to examine to which extent the different sectors are responsible for changes in the overall rates of unemployment in the two different periods.

Table 4.1 presents single variable regressions between employment growth in the various sectors and the average annual growth rate of unemployment for the two periods 1975-1985 and 1985-1994.[20]

For the entire sample including European and non-European OECD economies, we can see that employment growth in sectors 3 and 6 relates negatively and significantly to changes in

[20] t-values are in brackets. ***, **, and * means significant at the 1%-, 5%-, and 10%-level, respectively.

	Total Sample		European countries	
	1975-1985	1985-1994	1975-1985	1985-1994
Dependent variable: growth rate of unemployment rate s_u^c				
Sector 3	-0.930**	-0.671*	-1.482**	-1.365**
	(-2.565)	(-1.798)	(-2.379)	(-2.653)
$\mathbf{R^2}$	0.291	0.168	0.340	0.390
$\mathbf{\bar{R}^2}$	0.247	0.118	0.280	0.335
F-Value	15.831	1.975	14.284	4.076
Sector 6	-1.645***	-1.215***	-2.569***	-2.240***
	(-2.600)	(-2.960)	(-3.103)	(-5.185)
$\mathbf{R^2}$	0.297	0.354	0.467	0.710
$\mathbf{\bar{R}^2}$	0.253	0.314	0.418	0.683
F-Value	16.022	4.842	18.999	14.614
Sector 8	-1.557	-0.652	-4.299*	-0.800
	(-1.489)	(-0.953)	(-2.198)	(-0.793)
$\mathbf{R^2}$	0.122	0.054	0.305	0.054
$\mathbf{\bar{R}^2}$	0.067	-0.005	0.242	-0.032
F-Value	11.228	0.077	13.298	0.674
Sector 9	0.041	-0.056	-4.822***	-0.538
	(-0.067)	(-0.090)	(-3.687)	(-0.672)
$\mathbf{R^2}$	0.000	0.049	0.609	0.039
$\mathbf{\bar{R}^2}$	-0.062	-0.011	0.531	-0.048
F-Value	8.893	0.718	16.906	0.580
	Average annual growth rates			
Sector 3	-0.59	-0.41	-0.68	-0.37
Sector 6	-0.02	0.12	-0.03	0.10
Sector 8	0.12	0.23	0.12	0.21
Sector 9	0.29	0.12	0.38	0.14
Unemployment	0.60	0.29	0.71	0.14

Table 4.1: Sectoral growth and unemployment (single regressions)

unemployment rates, while the impact of sectors 8 and 9 are not significant over the first and second period. In the second period, the impact of the (negative) employment growth in sector 3 is reduced (a lower regression coefficient and only significant at the 10%-level).

For the European countries (excluding Great Britain) employment growth in sectors 3, 8, and 9 had a significant negative impact on the growth rate of unemployment over the first period.[21] We can see here that the relation between employment growth in sector 9 and the change in unemployment is indeed highly significant and has, for the period 1975-1985, the highest explanatory power of all the four sectors (with an R^2 of about 60 %). This changes dramatically for the second period (1985-1994) where employment decline in sector 3 and employment growth in sector 6 contribute further and more significantly to the explanation of the cross-country unemployment experience while employment growth in sector 9 does not contribute to it. A comparison of the results for the total sample as compared to the sample of the European economies without the UK also shows that the deindustrialisation factor contributes much more powerfully in the second period to an explanation of the unemployment experience in Europe as compared to the OECD as a whole.

These conclusions are also confirmed by the set of regressions reported in Table 4.2 in which the employment growth rates of all three sectors are considered jointly. Here we left out sector 8, as this sector had no significant impact in the single-regressions reported above.[22]

[21] Four European countries (Austria, Denmark, Ireland, and Netherlands) show the negative relationship between unemployment rate and the growth rate in sector 9 at much lower growth rate of sector 9. We therefore included an intercept-dummy for these countries over the first period, which is highly significant.

[22] Austria, Denmark, Ireland and Netherlands were removed from the sample (see footnote above).

	Total Sample		European countries	
	1975-1985	1985-1994	1975-1985	1985-1994
Dependent variable: growth rate of unemployment rate s_u^c				
Sector 3	-1.026***	-0.889***	-0.418	-1.178**
	(-3.624)	(-3.679)	(-0.676)	(-3.161)
Sector 6	-1.794***	-1.530***	-1.269	-1.845***
	(-3.638)	(-5.109)	(-1.121)	(-4.740)
Sector 9	-0.577	-0.564	-3.775*	-0.714
	(-1.395)	(-1.531)	(-2.181)	(-1.357)
$\mathbf{R^2}$	0.642	0.717	0.721	0.910
$\mathbf{\bar{R}^2}$	0.565	0.657	0.554	0.856
F-Value	17.116	9.345	9.277	16.148

Table 4.2: Sectoral growth and unemployment (joint regressions)

Employment growth in sector 9 is the only significant variable (although only at a 10%-level) for the group of European economies for the first period and not significant at all for the sample as a whole and becomes insignificant also for the European economies in the second period. Deindustrialisation also contributes powerfully in the second period both for the set of European economies and the overall sample. Employment growth in sector 6 (a sector which we classified as a low wage sector) is not very important for the European economies in the first period but is more important for the sample as a whole for both periods and for the European economies in the second period.

5 Conclusions and policy implications

This paper has examined structural employment patterns across the OECD economies. It attempted to contribute towards a 'structural' explanation of the European jobs crisis, especially as it evolved from the mid-1980s onwards. The following are the main results of our analysis:

- The period since the mid-1970s has seen major shifts in employment patterns across the OECD economies in terms of a decline in the share of employment in industry ('deindustrialisation') and an increase in the share of employees in tertiary activities ('tertiarisation'); in the Southern European economies there was also a significant fall of the shares of employment in agriculture ('deagrarianisation').

- As compared to the US, the European economies also experienced a much more dramatic process of deindustrialisation after the mid-1980s; we called this the 'lagged deindustrialisation thesis': For a sizeable group of continental European countries a significant speeding up of the deindustrialisation process could be observed some time in the mid-1980s or early 1990s; this was tested by means of spline regressions. This speeding up of deindustrialisation could not be observed in the case of the non-European OECD economies or the UK.

- Another important difference between the US and Japan, on the one hand, and the majority of the European economies is a sharp slow-down in the rate of employment absorption in the community and social services sector (ISIC sector 9) which employs the largest share of employees of all tertiary sectors. The community and social services sector ('welfare services' for short) showed, on the other hand, much higher rates of employment absorption in continental Europe over the earlier period (1974 to mid-1980s) than it did in the US, Japan or the UK. Again, the significance of a slowdown of employment absorption in the welfare services sector was tested by means of spline regressions.

- The contribution of this paper in terms of a 'structural explanation' of the European

jobs crisis particularly from the mid-1980s onwards is thus based on the above two factors: a continued and sometimes intensified process of de-industrialisation in a large group of continental European economies and a dramatic slowdown in the rates of employment absorption in the welfare services sector. Both these two factors were not observed in the case of the UK (which experienced the main phase of deindustrialisation earlier), the US or Japan. For some European countries a somewhat different pattern can be observed: In Denmark, Belgium and Italy both the labour absorption of sector 9 and the labour shedding of sector 3 decreased, Finland and Iceland experienced higher (negative) rates of growth of the employment shares in sector 3 (higher speed of deindustrialisation) but no significant decrease in the labour absorption in sector 9. Finally Sweden and Norway show a similar pattern in the dynamics of sector 9. In both countries there is a sharp decline of labour absorption at the beginning of the 80's and an increase in 1989. In Norway labour shedding fell dramatically at the beginning of the 90's. Sweden experienced high labour shedding up to 1982 in sector 3, very low labour shedding out of sector 3 in the 1980's, an again an increase in labour shedding at the beginning of the 1990's.

- In addition, other factors played a role to account for differences in structural employment patterns. First, the relative growth rates of employment in other tertiary activities (Wholesale and retail trade, restaurants and hotels (sector 6) and market services (sector 7 (transport, storage, and communication), and sector 8 (Financing, insurance, real estate, and business services)). Second, we were able to show in a regression analysis that cross-country differences in changes in rates of unemployment could be explained by the different countries' experiences in terms of 'deindustrialisation' and the patterns of employment growth in the different types of tertiary activities. The distinct patterns of continental European economies as against the UK, US and Japan (and some of the Scandinavian countries) emerged again.

What are the policy conclusions? Major sectoral shifts in employment patterns can cause severe 'matching problems' on the labour market. The skill structure of the labour force, the demographic and gender characteristics as well as the geographic location of the existing labour force might not match the new requirements of shifts in the structure of labour demand. In addition, legal and institutional features which might have been functional to support growth and employment in an economy with particular structural characteristics might no longer be adequate in a situation with changed structural characteristics. This issue is well-known as far as the problem of relocating labour from traditional core manufacturing industries is concerned. In this paper we pointed out that the major shifts within the tertiary sector (from the community and social services sector to distribution, recreational and market services) might similarly generate problems of adjustment. In this respect the US and Japan never had the same unbalanced growth pattern across these different types of tertiary activities which characterised the European economies in the past. It does look as if the 'European model' of fast (relative) expansion of employment in the 'community and social services' sector has come to an end at some point in the mid- to late-1980s and Europe has also moved towards a more balanced pattern of employment growth across the different tertiary services activities. However, skill requirements, work conditions and wage contracts differ widely in these different tertiary sectors and, hence, it is no wonder that a dramatic change in the structural employment pattern in this area also generates its own adjustment problems.

In a theoretical part of this paper, we examined why the European model of employment growth in the welfare services could no longer be (politically) sustained and we pointed out some of the differences between the European and the US model of social services provision which

have implications for sustainability of growth in this sector: the US model allows much more differentiation in the qualities of services provided and expansion is thus built upon an incentive of producers to exploit consumer rents while the European model imposed traditionally relative homogeneity in the provision of such services. It was demonstrated that expansion of this sector had to rely on a continuous process of redistribution; unbalanced productivity growth implied, furthermore, an increasing burden of such redistribution as a percentage of GDP. The (political) collapse of the 'European model' of welfare services expansion does not imply, by necessity, a full convergence to the US model and a full-scale political and scientific discussion is presently underway to which extent a more targeted approach towards (mixed public and private) welfare services provision can assure a sustainable new European model, distinct from both the US and the traditional European models. This paper did not delve into this discussion, but simply states that this regime switch has, indeed, started to occur some time in the mid- to late 1980s and has made its contribution to the 'structural' European jobs crisis.

There are other areas of policy discussion which are relevant to explain the structural employment patterns which we pointed out in this paper, such as that the different types of tertiary activities require to different extents low-skill, medium-skill and high-skill employees and that they differ in the degree to which performance can be monitored by employers and/or performance relies on job commitment differs between them. Hence the types of wage and employment contracts will differ and wage, employment and social security regulations but also public training and educational facilities will affect the relative expansion of jobs in the different services differently.

Annex

A Employment effects of distributive measures in the European model - a simple analytical representation

A.1 Introduction

In the following we go over the arguments concerning the way how redistribution of income affects the growth of output and employment in the European model (see discussion in section 2). We characterised the European model of welfare services provision as one in which clear restrictions are imposed on the degree of quality differentiation that can occur in the provision of welfare services. We assume that only a uniform quality of such a service is supplied to all income groups. The additional stylized facts are that in welfare services labour input coefficients are relatively high (it is labour-intensive) and the rate of (labour) productivity growth is rather low. Further welfare services are relatively skill-intensive.

The further assumption is that income elasticities for welfare services are equal or larger than one for low income groups. Thus with two different income groups with $w^l < w^*$ and $w^h > w^*$ a redistribution of income from the high to the low income groups would increase demand for welfare services and hence labour intensive goods and thus overall employment might rise.[23] The further assumption that welfare services employment is more skill-intensive would lead to a shift towards more skill-intensive jobs. Further, with a given (uniform) quality of a particular welfare service, there may also be a satiation level for the high income groups. This depends on the availability of outside options in service goods and on the supply of high-quality industrial goods as substitutes. Here again, a redistribution away from income groups with high income levels would boost employment levels. The impact of redistributive measures will be shown in more detail in a simple model below.

A second (but, as we shall see, related) potential reason for a demand constraint in the service sector is the increase in the relative price of service goods (Baumol's 'cost disease'). In the above scenario we show that a redistributive measure (income subsidies to low-income groups or direct price subsidies of welfare services) reduces the demand constraint for a good of homogenous quality (the constraint on homogeneity in quality justifies the shape of the upper part of the Engels curve). A second step in the argument is to analyse the dynamic implications. Here we rely on the contributions made by Baumol and associates (Baumol et al., 1989) who work out the implications of unbalanced productivity growth in relation to different expenditure structures. As long as real expenditure structures remain somewhat constant, uneven productivity growth (across sectors) combined with rigidities in the relative wage structure across sectors leads to changes in the nominal expenditure shares. A growing share of nominal spending will go onto spending on products/services produced by low productivity growth sectors (in our case welfare services).

The redistributive mechanism characterising the European model (see main text, section 2.2) implies that subsidies for income groups must rise in proportion to the relative price increases of the welfare services sector so that these income groups are able to pay for the more expensive service goods. Thus, if the subsidy element remains a constant fraction of the price of the welfare services, aggregate subsidies will have to rise as a fraction of total nominal expenditure, as the relative price of services is increasing.

Dynamically, the redistributive measure leads to an increasing subsidy burden in GDP (i.e. either a higher public expenditure/GDP ratio or higher lump-sum transfers from high to low

[23] As we shall see below, things are more complicated as shifts in demand towards sectors with lower productivity growth might also imply effects on real incomes which we shall track in the model below.

income groups). This rising burden will lead to the political constraint in the expansion of the welfare sector: the unwillingness of (parts of) the population to finance the expansion of this sector. A cap on the rise in transfers will then cause slower employment growth in the service sectors. The welfare services sector will stop to function as employment absorber; the 'European model' of welfare services growth collapses and a structural jobs crises emerges, until alternative sectors act as employment absorbers (see section 2.1 above).

A.2 The structure of the model

The arguments above are now reproduced in a simple analytical framework. First we present the structure of a multisectoral model, the equilibrium solutions and some comparative-static analysis. On the cost side there is a coefficients matrix $\mathbf{A}$ with the interindustrial input requirements and a (row) vector of labour input coefficients for skill groups and industries $\mathbf{a}'_L = (a^s_{L1}, a^u_{L1}, \ldots, a^s_{Li}, a^u_{Li}, \ldots, a^s_{LN}, a^u_{LN})$. This vector includes the labour input coefficients a^z_{Li} for each industry $i = 1 \ldots N$ and each skill-type of worker $z = s, u$ for skilled and unskilled respectively.[24] In the following the skill groups also represent the different income groups. Labour demand is then given by $l^z_i = a^z_{Li} q_i$ where q_i denotes output in industry i. Further the wages of the workers w^z_i are assumed to be fixed exogenously. Nominal prices are assumed to be equal to costs, thus

$$\mathbf{p}' = \boldsymbol{\omega}' (\mathbf{I} - \mathbf{A})^{-1}$$

where $\boldsymbol{\omega}' = (\omega^s_1, \ldots, \omega^u_N)$.

$\omega^z_i = a^z_{Li} w^z_i$ denotes the labour unit costs of each skill group z in each industry i.

In this simple economy only wage income exists as the profit rate is assumed to be zero. The demand for goods thus consists of demand for interindustrial inputs and the structure of the wage demand. The latter can be described for each income or skill group by a matrix

$$\mathbf{D}^z_L = \begin{pmatrix} \alpha^z_1 \frac{w^z_1 l^z_1}{p_1} & \ldots & \alpha^z_1 \frac{w^z_N l^z_N}{p_1} \\ \vdots & \ddots & \vdots \\ \alpha^z_n \frac{w^z_1 l^z_1}{p_N} & \ldots & \alpha^z_n \frac{w^z_N l^z_N}{p_N} \end{pmatrix} = \begin{pmatrix} \alpha^z_1 \frac{\omega^z_1}{p_1} & \ldots & \alpha^z_1 \frac{\omega^z_N}{p_1} \\ \vdots & \ddots & \vdots \\ \alpha^z_N \frac{\omega^z_1}{p_N} & \ldots & \alpha^z_N \frac{\omega^z_N}{p_N} \end{pmatrix} \begin{pmatrix} q_1 \\ \vdots \\ q_N \end{pmatrix}$$

The nominal income shares, denoted by α^z_i, are different between income groups and are given exogenously. We assume that the higher income group has a higher nominal share of expenditure on services than the lower income group. In a more advanced setting these shares could be derived from utility functions implying non-linear Engel curves. The quantity system can then be written as

$$\mathbf{q} = \left(\mathbf{A} + \sum_z \mathbf{D}^z_L \right) \mathbf{q}$$

where $\mathbf{q}' = (q_1, \ldots, q_N)$. This is a homogenous system as

$$\left(\mathbf{A} + \sum_z \mathbf{D}^z_L - \mathbf{I} \right) \mathbf{q} \equiv (\boldsymbol{\Theta} - \mathbf{I})\, \mathbf{q} = \mathbf{0}$$

[24] The model could be readily extended to more than two skill groups.

For nontrivial solutions the condition $\det(\mathbf{\Theta} - \mathbf{I}) = 0$ has to be fulfilled. This condition is guaranteed, as it can be shown that the rows are linearly dependent. In such a system it is not possible to determine the activity level of the economy, but only the structure of the output.

In this simple setting only stationary solutions are possible as there are no rents to be reinvested or productivity gains which can be used to extend production (the latter will however be considered below).[25] We will present the equilibrium solutions with respect to the parameter values used in the simulations.

A.2.1 The simulation model

In this section we present the parameter and starting values for the simulation studies discussed below. There are 2 sectors, manufacturing (sector 1) and welfare services (sector 2). The first sector uses less labour than the service sector and the service sector is more skill-intensive.[26] There is no saving and all income is spent immediately. The demand structure differs between the two skill groups. For simplicity we assume exogenous nominal shares for the two income groups and also the changes in the shares if income changes due to redistribution (these shifts reflect the non-linearity of the Engel curves discussed above).

The concrete parameter values and resulting equilibrium values (which we use as starting points) are as follows: The input-output coefficient matrix[27] is

$$\mathbf{A} = \begin{pmatrix} 0.25 & 0.00 \\ 0.15 & 0.00 \end{pmatrix}$$

The vector of labour input coefficients is given by

$$\mathbf{a}_L' = (1, 2, 3, 4)$$

Wages are assumed constant and given exogenously and are assumed equal across industries but different between skill groups, using $w^s = 5$ and $w^u = 2$ as concrete values. The different skill groups represent the two income groups, thus having different nominal shares in consumption, $\alpha_1^s = 0.25$ and $\alpha_1^u = 0.75$. The nominal shares in the services sector are $1 - \alpha_1^z$. The resulting equilibrium prices are

$$\mathbf{p} = (16.6, 23.0)$$

As the level of output is not determined, we set output of sector 1 equal to 1 to determine the output structure

$$\mathbf{q} = (1, 0.841)$$

The resulting labour demand is then $l_1^s = 1$, $l_1^u = 2$, $l_2^s = 2.523$, and $l_2^u = 3.364$.

The structure of output and employment patterns is given in Table A.1 (in percentage of total output or total employment, respectively).

[25] See, however, Landesmann and Stehrer (1999) where a more elaborate version of this type of model (including rents) is explored.

[26] Ideally, we should expand the model to include a second services sector which could be much less skill intensive (such as distribution and recreational services) in this model. However, the focus is on the welfare services sector which is relatively skill intensive (see Landesmann and Pichelmann (1998)).

[27] The welfare services sector here is assumed to only have direct labour inputs, however, this assumption could easily be dispatched without affecting the qualitative results.

Equilibrium structure	
q_1	54.32
q_2	45.68
l^s	39.64
l^u	60.36
l_1	33.76
l_2	66.24

Table A.1: Equilibrium structure of output and employment

A.2.2 Redistributional effects

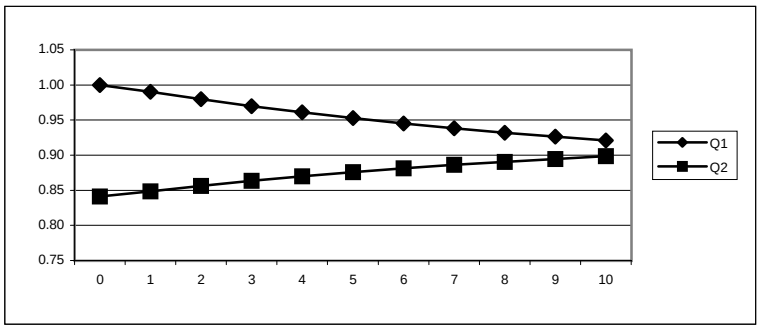
What are the effects of redistributing income from the high to the low income group. Redistribution in this model set-up does not alter the relative prices, as the wage rates firms have to pay remain constant and productivity levels for now remain constant too. We assume that subsidies to the low income group are financed by taxing the high income group, in the way that the budget is balanced, thus $t^s \sum_i l_i^s w_i^s = -t^u \sum_i l_i^u w_i^u$ For a given subsidy t^u the high income group has to be taxed by the rate

$$t^s = -\frac{\sum_i l_i^u w_i^u}{\sum_i l_i^s w_i^s} t^u$$

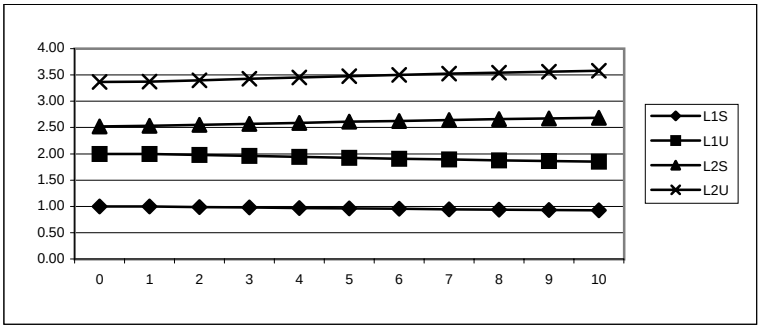
We now introduce a subsidy to the low income groups of 25 % and assume that due to higher wages the nominal expenditure share for the manufacturing good is declining to $\alpha_1^u = 0.50$. This shift in nominal shares implies an income elasticity for services larger than 1. The nominal shares of the high income group remain constant (income elasticity of 1).

The effects of introducing a subsidy of $t^u = 0.25$ on output and employment can be seen from Figure A.1. Output of the manufacturing sector is declining, whereas output of services is rising due to rising demand of services from the low income groups. The effect depends on the change in the nominal expenditure shares. Redistribution has two effects: First, there is a higher real income in the economy as a whole as the low-income group spends relatively more on the relatively cheaper (manufacturing) goods. This 'real income effect' raises demand and total output, and potentially employment. On the other hand, a higher proportion is spent on goods which are produced by less labour (i.e. manufacturing), thus depressing employment ('employment effect'). The outcome between these two effects depends on relative prices and the structure of the labour input coefficients. Thus a rise in the nominal expenditure share on services has the effect of reducing the 'real income effect' (i.e. depressing output) but also lowers the (negative) 'employment effect' (more is spent on labour intensive goods). Thus the (exogenous) shift in the nominal shares α_i^z has to be large enough to produce positive effects on employment; this is guaranteed for the parameters used in our simulations. Further this kind of redistribution only has level effects on output and employment, but no long-term growth effects. The new long term levels are $q_1 = 0.866$, $q_2 = 0.938$ and for employment $l_1^s = 0.867$, $l_1^u = 1.732$, $l_2^s = 2.810$ and $l_2^u = 3.759$. Table A.2, which can be compared with Table A.1 gives the structure of output and employment in the new steady-state equilibrium. The share of output in sector 1 is declining, whereas the share of services in total output is rising. Employment shifts occur mainly between sectors and only to a very small extent between skill-groups.
Figure A.2 shows the real tax burden b for the high-income group, defined by

$$b = \frac{(l_1^{ds} w_1^s + l_2^{ds} w_2^s)}{\alpha_1^s p_1 + \alpha_2^s p_2} t^s$$



Panel A: Output



Panel B: Employment

Figure A.1: Effects of wage subsidy for low income groups

Equilibrium structure	
q_1	47.99
q_2	52.01
l^s	40.13
l^u	59.87
l_1	28.35
l_2	71.65

Table A.2: Equilibrium structure of output and employment with redistribution

The real tax burden b is constant in the long run at a level of -0.127 once the structure of employment reaches an equilibrium as wages and productivity levels (and hence prices) are constant.

A.2.3 Introducing the effects of unbalanced and skill-biased productivity growth

We assume that there is labour saving technological progress only for unskilled workers in the manufacturing sector at an exogenous rate of productivity growth. Further we assume that the gains from productivity growth find expression immediately in higher real incomes and higher real spending which, in turn, is distributed between the sectors in line with changing expenditure structures.[28]

[28] This procedure avoids the emergence of an 'effective demand problem', which could arise as a result of the instability of the output system in our current formulation, as the largest eigenvalue of that system is zero in

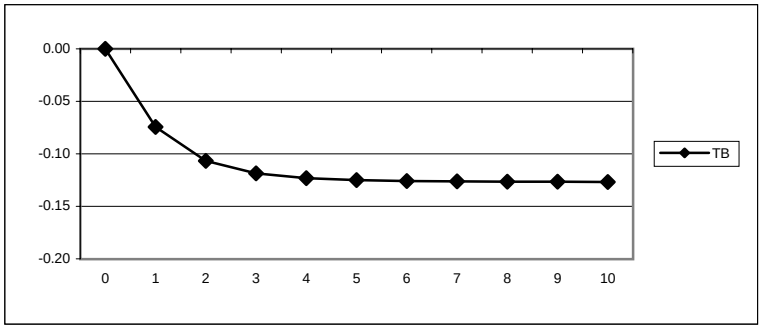


Figure A.2: Tax burden

	Growth Rates		Structure	
	$t^u = 0.00$	$t^u = 0.25$	$t^u = 0.00$	$t^u = 0.25$
q_1	0.56	0.46	56.54	52.10
q_2	0.48	0.56	43.55	47.90
l^s	0.43	0.46	43.15	43.12
l^u	0.29	0.32	56.85	56.88
l_1	0.24	0.14	29.51	26.26
l_2	0.45	0.53	70.49	73.74

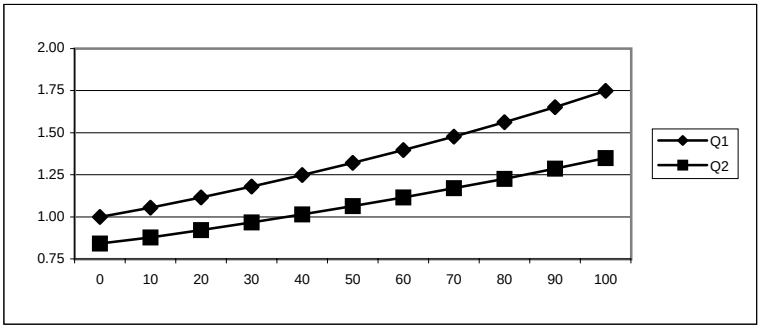
Table A.3: Effects of technical change and redistribution

For prices we assume that they adjust immediately to the lower costs. Output is formulated dynamically as a simple 'supply adjusts to demand' differential equation. Given our information of the demand side of the model (in terms of exogenously fixed nominal expenditure shares), relative price changes imply substitution effects of a Cobb-Douglas type (i.e. changes in relative prices generate proportionate changes in relative quantities). Figure A.3 presents the simulation results for output and employment without redistribution. Output in sector 1 is rising faster as productivity gains lead to manufacturing goods becoming relatively cheaper, thus expenditures are switching to the manufacturing sector. Due to this output growth employment is growing too. Employment for unskilled workers is growing only very little as technological progress is biased against it. Employment in the service sector is growing equally for both skill groups. (We assume no changes in input coefficients in this sector.)

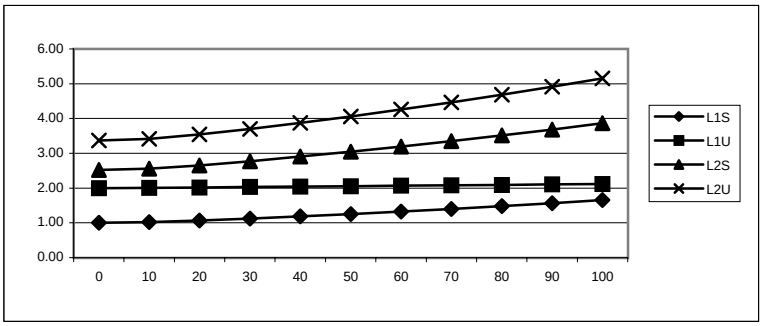
Introducing redistribution as described above into the productivity enhanced version of the model changes the results slightly. Output of services is rising much faster than without redistribution, whereas the output growth of manufacturing is lower (Figure A.4 compared to Figure A.3, Panel A). The differences between the scenarios without and with redistribution are best discussed in terms of the growth rates. Table A.3 presents the growth rates (in percentage) of output and employment in the two scenarios and the structure of both variables at the end of the simulations.

The first column gives the growth rates of output and employment without redistribution, the second column with redistribution from high to low income groups. As one can easily see, in the latter case output growth rises in the services sectors and declines in the manufacturing sector, due to redistribution. Compared to the initial structure (see Table A.1) the output share

equilibrium.



Panel A: Output



Panel B: Employment

Figure A.3: Output and employment with biased technological progress

of services declines in the scenario without redistribution, but rises with redistribution.

This is also reflected in the dynamics of the employment shares. In the first scenario (without redistribution) the share of employment in services is lower at the end than in the second scenario, although it is growing in both scenarios, thus the employment shift due to substitution effects (as relative prices change) is lower than the impact of the biased technological progress. But again, there is no large difference between the two scenarios with respect to the shares of skilled versus unskilled workers.

But due to changes in relative prices and restructuring of employment the real tax burden b for the high income groups is rising, as can be seen in Figure A.5. A cut in redistribution, i.e. lowering the subsidy rate t^u, would then have the opposite effects on output and employment growth presented in Table A.3 above.

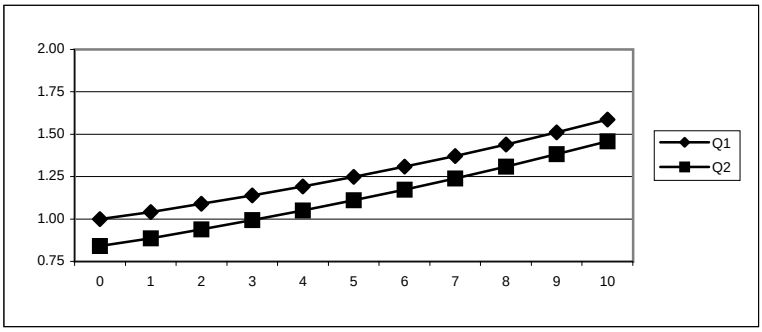


Figure A.4: Output with biased technological progress and redistribution

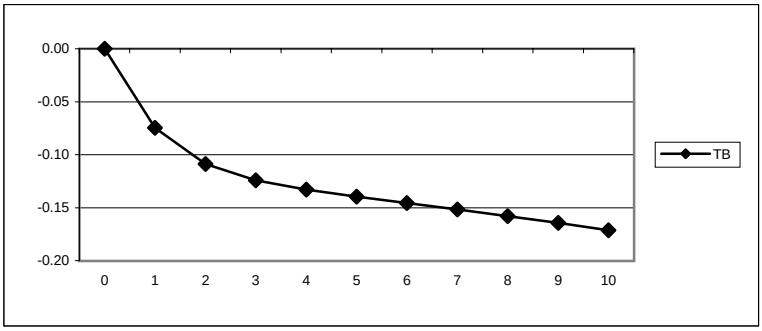
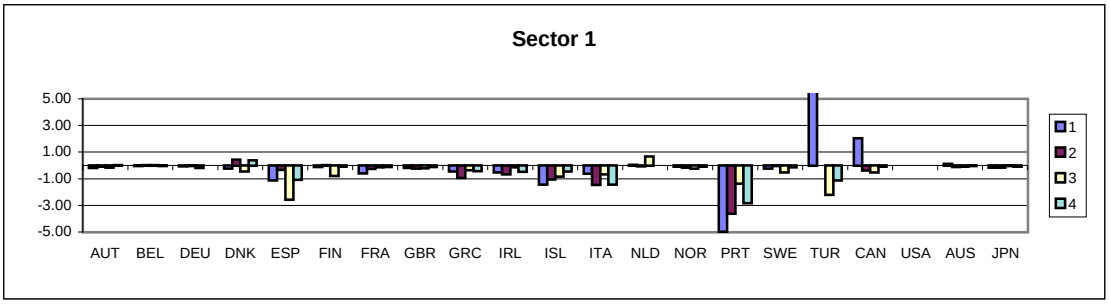
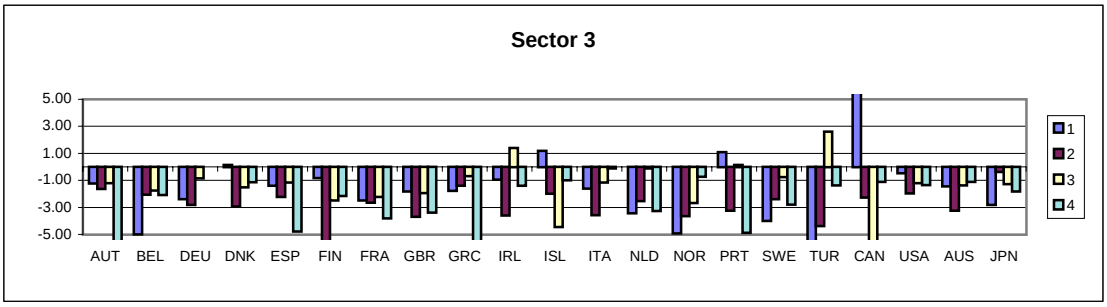


Figure A.5: Tax burden with biased technological progress

B Tables and figures

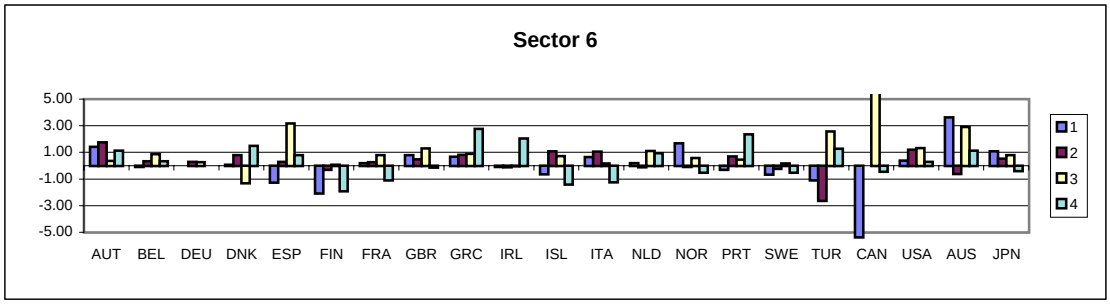


Panel A

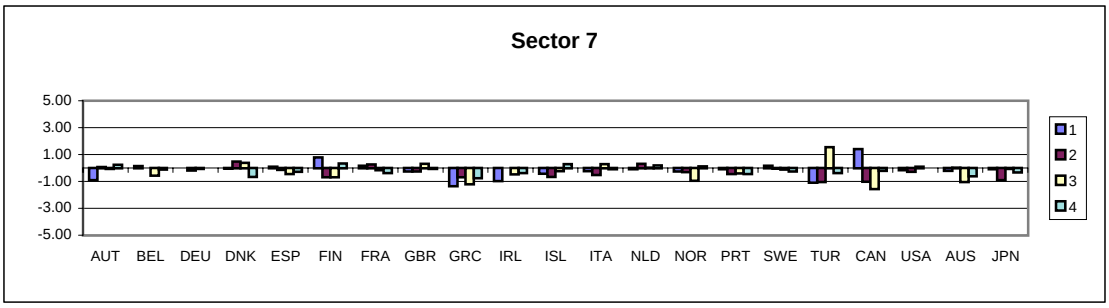


Panel B

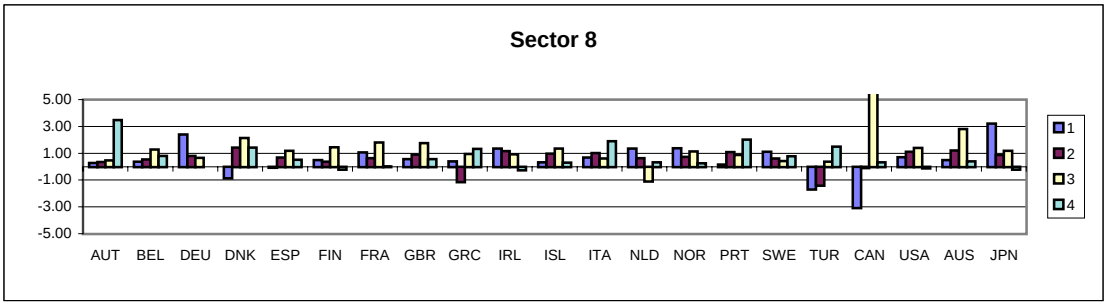
Figure B.1: Country and sector specific dynamics of change: sectors 1 and 3



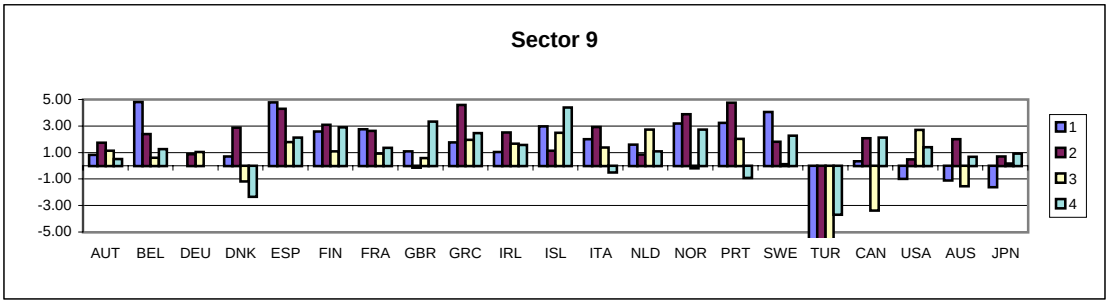
Panel A



Panel B



Panel C



Panel D

Figure B.2: Country and sector specific dynamics of change: sectors 6 - 9

Table B.1: Country and sector specific dynamics of change

Sector 1																					
	AUT	BEL	DEU	DNK	ESP	FIN	FRA	GBR	GRC	IRL	ISL	ITA	NLD	NOR	PRT	SWE	TUR	CAN	USA	AUS	JPN
1	-0.16	-0.04	-0.04	-0.22	-1.10	-0.09	-0.57	-0.17	-0.44	-0.51	-1.42	-0.59	0.05	-0.07	-4.94	-0.22	6.81	2.04	n.a.	0.13	-0.13
2	-0.07	0.02	-0.01	0.43	-0.32	0.03	-0.23	-0.22	-0.92	-0.66	-1.04	-1.45	-0.04	-0.15	-3.59	-0.01	0.00	-0.35	n.a.	-0.08	-0.14
3	-0.15	0.01	-0.16	-0.44	-2.55	-0.76	-0.12	-0.19	-0.33	-0.11	-0.82	-0.65	0.67	-0.21	-1.35	-0.50	-2.19	-0.51	n.a.	-0.08	-0.03
4	0.02	-0.02	n.a.	0.38	-1.06	-0.06	-0.09	-0.10	-0.41	-0.45	-0.44	-1.43	0.00	-0.08	-2.81	-0.13	-1.10	-0.07	n.a.	-0.02	-0.08
Sector 3																					
	AUT	BEL	DEU	DNK	ESP	FIN	FRA	GBR	GRC	IRL	ISL	ITA	NLD	NOR	PRT	SWE	TUR	CAN	USA	AUS	JPN
1	-1.20	-4.97	-2.36	0.15	-1.37	-0.81	-2.47	-1.80	-1.76	-0.92	1.19	-1.60	-3.41	-4.91	1.10	-3.98	-12.27	8.54	-0.46	-1.43	-2.79
2	-1.61	-2.04	-2.80	-2.91	-2.21	-5.83	-2.64	-3.68	-1.39	-3.57	-1.98	-3.56	-2.51	-3.63	-3.22	-2.38	-4.37	-2.26	-1.93	-3.22	-0.34
3	-1.18	-1.73	-0.83	-1.50	-1.13	-2.45	-2.21	-1.93	-0.67	1.40	-4.44	-1.13	-0.10	-2.66	0.14	-0.73	2.61	-11.51	-1.17	-1.35	-1.25
4	-6.12	-2.05	n.a.	-1.11	-4.77	-2.13	-3.79	-3.35	-5.76	-1.37	-0.98	-0.10	-3.24	-0.71	-4.85	-2.76	-1.34	-1.10	-1.33	-1.08	-1.79
Sector 6																					
	AUT	BEL	DEU	DNK	ESP	FIN	FRA	GBR	GRC	IRL	ISL	ITA	NLD	NOR	PRT	SWE	TUR	CAN	USA	AUS	JPN
1	1.42	-0.07	n.a.	0.08	-1.24	-2.07	0.19	0.80	0.66	-0.08	-0.63	0.64	0.20	1.67	-0.30	-0.65	-1.09	-5.35	0.37	3.64	1.07
2	1.75	0.33	0.30	0.80	0.29	-0.30	0.26	0.47	0.81	-0.09	1.07	1.06	-0.09	-0.07	0.70	-0.23	-2.62	0.01	1.21	-0.60	0.53
3	0.35	0.87	0.27	-1.29	3.18	0.07	0.78	1.30	0.88	-0.02	0.73	0.16	1.09	0.57	0.45	0.16	2.58	6.84	1.32	2.90	0.80
4	1.13	0.34	n.a.	1.49	0.79	-1.89	-1.09	-0.12	2.76	2.04	-1.39	-1.22	0.93	-0.50	2.35	-0.51	1.27	-0.44	0.28	1.13	-0.40
Sector 7																					
	AUT	BEL	DEU	DNK	ESP	FIN	FRA	GBR	GRC	IRL	ISL	ITA	NLD	NOR	PRT	SWE	TUR	CAN	USA	AUS	JPN
1	-0.88	0.14	n.a.	-0.04	0.09	0.80	0.17	-0.24	-1.33	-0.95	-0.40	-0.22	-0.07	-0.25	-0.06	0.18	-1.07	1.41	-0.15	-0.20	-0.08
2	0.08	-0.01	-0.18	0.47	-0.13	-0.65	0.25	-0.23	-0.65	0.00	-0.64	-0.49	0.31	-0.29	-0.43	-0.03	-1.02	-0.99	-0.26	0.03	-0.89
3	-0.05	-0.54	-0.05	0.38	-0.44	-0.66	-0.14	0.31	-1.19	-0.46	-0.22	0.28	0.01	-0.94	-0.37	-0.10	1.56	-1.56	0.09	-1.02	-0.04
4	0.25	-0.10	n.a.	-0.64	-0.26	0.34	-0.36	-0.04	-0.73	-0.35	0.29	-0.06	0.19	0.13	-0.42	-0.24	-0.36	-0.19	0.00	-0.59	-0.31
Sector 8																					
	AUT	BEL	DEU	DNK	ESP	FIN	FRA	GBR	GRC	IRL	ISL	ITA	NLD	NOR	PRT	SWE	TUR	CAN	USA	AUS	JPN
1	0.28	0.38	2.40	-0.84	-0.06	0.49	1.07	0.56	0.39	1.36	0.33	0.69	1.35	1.36	0.16	1.10	-1.67	-3.07	0.70	0.49	3.21
2	0.34	0.53	0.79	1.42	0.69	0.38	0.63	0.89	-1.14	1.16	0.98	1.01	0.63	0.73	1.08	0.62	-1.40	-0.09	1.11	1.21	0.86
3	0.46	1.28	0.65	2.13	1.17	1.46	1.79	1.76	0.94	0.93	1.35	0.62	-1.08	1.13	0.87	0.41	0.37	5.88	1.40	2.80	1.19
4	3.48	0.79	n.a.	1.43	0.50	-0.19	0.00	0.56	1.32	-0.25	0.30	1.91	0.32	0.25	2.01	0.77	1.48	0.31	-0.11	0.40	-0.20
Sector 9																					
	AUT	BEL	DEU	DNK	ESP	FIN	FRA	GBR	GRC	IRL	ISL	ITA	NLD	NOR	PRT	SWE	TUR	CAN	USA	AUS	JPN
1	0.81	4.80	n.a.	0.70	4.77	2.59	2.76	1.09	1.77	1.04	2.98	2.02	1.58	3.19	3.23	4.06	-16.41	0.34	-0.96	-1.09	-1.59
2	1.75	2.40	0.88	2.88	4.29	3.09	2.62	-0.13	4.58	2.51	1.13	2.92	0.83	3.89	4.75	1.81	-7.35	2.09	0.49	2.01	0.71
3	1.13	0.61	1.04	-1.15	1.79	1.10	0.91	0.58	1.96	1.67	2.49	1.38	2.72	-0.17	2.04	0.12	-7.18	-3.35	2.71	-1.52	0.16
4	0.50	1.27	n.a.	-2.33	2.14	2.90	1.35	3.34	2.46	1.57	4.41	-0.49	1.09	2.73	-0.90	2.26	-3.66	2.13	1.40	0.68	0.91

Employment growth rates (in %)

	AUT	BEL	DEU	DNK	ESP	FIN	FRA	GBR	GRC	IRL	ISL	ITA	NLD	NOR	PRT	SWE	TUR	CAN	USA	AUS	JPN
1	1.63	0.09	1.11	1.86	-1.75	0.24	0.90	0.49	1.64	2.33	2.58	0.34	1.19	2.74	0.42	0.83	3.22	3.58	3.87	0.48	1.53
2	1.61	-1.26	-0.10	0.90	-2.53	1.74	-0.09	-1.81	1.61	-0.39	2.73	-0.12	0.73	0.88	1.98	0.46	2.53	1.12	1.01	1.25	1.90
3	0.80	0.94	1.19	1.45	3.90	0.67	0.72	1.48	1.59	-0.15	1.26	0.71	3.95	1.11	2.11	0.63	0.42	2.98	1.67	3.67	1.83
4	2.51	0.42	n.a.	-0.33	-0.51	-4.17	1.23	-0.75	1.34	2.81	0.71	-0.67	1.23	0.29	0.64	-3.01	2.42	-0.04	1.84	0.20	2.24

Subperiod 1: 1975 - 1979
Subperiod 2: 1979 - 1984
Subperiod 3: 1984 - 1989
Subperiod 4: 1989 - 1994

Note:
75 - 80
80 - 85
85 - 89

Note:
85 - 90
90 - 94

References

Aghion, P. and P. Howitt (1998). *Endogenous Growth Theory*. MIT Press.

Baumol, W. (1987, June). Macroeconomics of unbalanced growth. *American Economic Review 53*, 941–973.

Baumol, W., S. Blackman, and E. Wolff (1985, September). Unbalanced growth revisited: Asymptotic stagnancy and new evidence. *American Economic Review 75*, 806–817.

Baumol, W., S. Blackman, and E. Wolff (1989). *Productivity and American Leadership: The Long View*. MIT Press.

Chenery, H. (1960). Patterns of industrial growth. *American Economic Review* (50), 624–654.

Chenery, H. and M. Syrquin (1975). *Patterns of Development*. Oxford University Press, London.

Clark, C. (1957). *The Conditions of Economic Progress*. Macmillan, New York.

Davis, S., J. Haltiwanger, and S. Schuh (1997). *Job Creation and Destruction*. MIT-Press, Cambridge/Mass.

Fourastié, J. (1949). *Le grand espoir du XXe siècle*. P.U.F., Paris.

Glyn, A. (1995, Spring). The assessment: Unemployment and inequality. *Oxford Review of Economic Policy 11*, 1–25.

Hackl, P. (1989). *Statistical Analysis and Forecasting of Economic Structural Change*. Springer-Verlag.

Hagemann, H. (1990). The structural theory of growth. In M. Baranzini and R. Scazzieri (Eds.), *The Economic Theory of Structure and Change*. Cambridge University Press.

Hansen, B. (1992). Testing for parameter instability in linear models. *Journal of Policy Modeling 14*(4), 517–533.

Hicks, J. (1973). *Capital and Time*. Oxford University Press.

Inman, R. (1985). *Managing the Service Economy*. CUP, Cambridge.

Johnston, J. (1987). *Econometric Methods*, Chapter 6. MacGraw-Hill.

Johnston, J. and J. Dinardo (1997). *Econometric Methods* (4 ed.)., Chapter 4. MacGraw-Hill.

Landesmann, M. and K. Pichelmann (1998). Structural employment patterns and the welfare services sector. In M. Landesmann and K. Pichelmann (Eds.), *Unemployment in Europe*. MacMillan, London; forthcoming.

Landesmann, M. and R. Stehrer (1999). Industrial specialisation, catching up and labour market dynamics. *Metroeconomica 50*(3). forthcoming.

Lowe, A. (1976). *The Path of Economic Growth*. Cambridge University Press.

Neisser, H. (1942). 'Permanent' technological unemployment. *American Economic Review 32*, 50–71.

Pasinetti, L. (1981). *Structural Change and Economic Dynamics*. Cambridge University Press.

Pasinetti, L. (1993). *Structural Economic Dynamics*. Cambridge University Press.

Petit, P. (1986). *Slow Growth and the Service Economy*. Frances Pinter Publ., London.

Pissarides, C. (1990). *Equilibrium Unemployment Theory*. Oxford University Press.

Poirier, D. (1991). The econometrics of structural change: A retrospective view. *Structural Change and Economic Dynamics 2*(2).

Ricardo, D. (1881). *On the Principles of Political Economy and Taxation* (3 ed.).

Rowthorn, B. and A. Glyn (1990). The diversity of unemployment experience since 1973. *Structural Change and Economic Dynamics 1*(1), 57–89.

Rowthorn, R. and J. Wells (1987). *Deindustrialisation and Foreign Trade*. CUP, Cambridge.

Shaked, A. and J. Sutton (1982). Relaxing price competition through product differentiation. *Review of Economic Studies 49*, 3–13.