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Final Demand and Production Structure: Services and Consumption

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The DEMPATEM research project (2001-2004) addressed *Demand Patterns and Employment Growth: Consumption and Services in France, Germany, the Netherlands, Spain, the United Kingdom and the United States.* It was a joint undertaking of the Universities of Amsterdam, Utrecht, Oxford and Paris-I Sorbonne, and the University Carlos III in Madrid, University College London and 17th Street Economics, Washington DC. The project was financially supported by the Socio-economic Key Action of the Fifth Framework Programme of the European Commission (HPSE-CT-2001-00089). List of the full project membership and all working papers can be found at the end of the paper.

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ABSTRACT

We use input-output techniques to assess the contribution of patterns of final demand and consumption to the differing employment rates observed across six industrialized economies. The key concept utilised is the employment generated economy-wide in supplying each product or service to final demand, including all stages in the supply chain - the concept of the 'vertically integrated sector' (VIS).

The main conclusions are:

(1) On a VIS basis the relative employment-friendliness of demand in individual sectors remains fairly constant over time within countries and fairly similar across countries. The European economies are rather more similar to each other than to the US.

(2) The employment-intensities of services and manufacturing are broadly equal, when measured on a VIS basis.

(3) Final demands originating in both manufacturing and services are increasingly generating jobs located in services.

(4) The changing patterns of final demand have been significantly employment-friendly in the European economies, but employment-neutral in the US. The final demand mixes of the European economies are more employment-friendly than the US pattern. The demand mixes of all the European countries would raise US employment, while the US mix would result in lower employment in the European economies.

(5) The changing mix of consumption has been significantly less employment-friendly than final demand, and only a minor source of employment growth within each economy. The European consumption patterns tend to be less employment-friendly than that of the US. The consumption patterns of France and Germany would reduce US employment by 3-5% respectively, while those of the UK and Spain would have little effect. Conversely, if the US consumption mix were adopted in the European economies employment there would be 2-4% higher.

(6) Demand growth has been the major source of employment growth, offset by job losses through labour productivity gains. Structural change along the supply chain, including outsourcing, both creates and destroys jobs, with only a small net effect. In the US stronger demand growth has brought more job creation, while weaker productivity gains have been less

job-destroying than in the European economies. These are the major factors, which have opened up the employment gap.

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INTRODUCTION

It is often remarked that services are more labour-intensive than manufactured goods, and that the growth of labour productivity in the production of services is less rapid than in manufacturing. To the extent that the first of these generalisations is true, higher levels of employment may be expected when demand patterns are oriented towards services. To the extent that the second is true, the economy will be characterised by lower productivity growth overall as the services sector becomes more important.

However, both of these generalisations are based on the final stage of production only – in the case of services at the point of delivery. While the travel agent or pharmacist provides a face-to-face service which itself is labour-intensive, it involves accessing databases collated and maintained elsewhere, using software developed in other service sectors, and communications links and electronic equipment bought in from manufacturing and construction. Production in these sectors in turn requires a further range of purchased inputs, again drawn from both manufacturing and services. While economic analysis tends to concentrate on final output and the use of primary factors, much of the economy's output and employment are involved in intermediate stages of the production process. Although productivity gains may be difficult to achieve in the face-to-face delivery of services, developments in information and communications technology in earlier stages of the supply chain are now transforming the overall efficiency of delivery in a number of areas of services.

Our purpose in this paper is to analyse the employment records of the six economies (US, UK, Germany, France, Netherlands and Spain) focusing on the employment generated throughout the economy by final demand and by the consumption expenditure of households. At the centre of the analysis will be the linkages from final demand to employment through the production structure. We will use detailed input-output systems for each country to identify inter-industry supply chains and trace the employment generated at each stage.

The use of the input-output framework brings an important change to the perspective and measurement of the employment generated by different activities. Conventional measurement

allocates employment to the sector to which the establishment is classified by its principal production activity. So railway employees are allocated to the transportation sector, whether the transportation supplied is a service to final consumers, or involves the movement of fuel to power stations or steel to car plants. The input-output approach, by contrast, attributes to the sector the employment contributing to the final output across all the stages of production. Where the steel is delivered to car plants the transportation involved and the associated employment are attributed to the final output of motor vehicles; and similarly for the inputs into later stage inputs into final production, as with the fuel to electricity generation to the final consumer. On the same perspective, efficiency gains are not confined to the point of delivery but can be achieved throughout the supply chain. This perspective has been designated by Pasinetti the 'vertically integrated sector' (Pasinetti, 1973). It will be the key concept in much of the remainder of the paper.

The structure of the paper is as follows. Section 2 gives a more formal development of the concept of the vertically integrated sector (VIS), and illustrates the re-attribution of employment on this basis. Section 3 then reviews the employment-intensities of individual industries on the VIS basis. These are compared over time and across the six economies. In Section 4 we examine the relative employment-intensity of manufactures as against services within this framework, and find the familiar generalisation about the labour-intensity of services to have little empirical support. Section 5 estimates the contribution to employment growth which can be attributed to the changing pattern of demand in each country. We do this for the product mix both in overall final demand and within the consumption basket, and find that the evolving product mix within final demand has been mildly employment-friendly in European countries. In Section 6 we estimate a set of counterfactuals across countries, deriving the employment levels which would have resulted in the US had final demand and consumption followed the mix from each of the European economies and, conversely, had each of the European economies followed the more service-oriented demand and consumption patterns of the US rather than their own. Again the implications for the level of employment are found to be very limited. In Section 7 we take up the analysis of employment change within the six economies, attributing this across the three proximate sources of the growth of final demand, structural change as encapsulated in input-output relations, and labour productivity growth. This reveals some striking empirical regularities. Structural change is on occasion job-creating, on occasion job-destroying, and on occasion job-transferring, for example through outsourcing. But its overall contribution to

employment change is small. The main contributors are, on the one hand, the growth of final demand, generating employment, and, on the other hand, labour productivity growth, which is job-saving. It is the outcome of the race between these opposing forces that largely determines the trend in employment within each economy, and gives the main insight into the development of the US-EU employment gap. Section 8 concludes.

1 THE INPUT-OUTPUT APPROACH TO EMPLOYMENT: THE VERTICALLY INTEGRATED SECTOR

This section lays out the framework for the analysis of employment within an input-output system, using the concept of the vertically integrated sector (VIS). This will show how the allocation of economy-wide employment across individual sectors as conventionally measured relates to the VIS measure.

In the input-output framework total employment can be expressed as

$$\begin{aligned} N &= \boldsymbol{n}' \boldsymbol{X} \\ &= \boldsymbol{n}' (\boldsymbol{I} - \boldsymbol{A})^{-1} \boldsymbol{F} \end{aligned} \qquad [1]$$

where N is the (scalar) level of total employment, $\boldsymbol{X}$ and $\boldsymbol{F}$ are column vectors of gross output and final demand for domestic output by sector,[1] $(\boldsymbol{I} - \boldsymbol{A})^{-1}$ is the Leontief inverse matrix and $\boldsymbol{n}'$ the row vector of labour requirements per unit of sectoral gross output[2]. The first line of equation [1] expresses total employment in terms of sectoral gross outputs and the associated labour requirements within the sector. The second line of equation [1] uses the input-output relationship of the Leontief multiplier, $\boldsymbol{X} = (\boldsymbol{I} - \boldsymbol{A})^{-1}\boldsymbol{F}$ to express total employment as a function of final demands for domestically produced goods and services as transmitted through the inter-industry (input-output) structure. Final demand for the output of sector i, F_i, gives rise to gross output in (all) other sectors through the chain of intermediate purchases encapsulated in the Leontief inverse, and therefore to employment in (all) other sectors.

The different basis for the allocation of economy-wide employment across sectors on the VIS approach can be shown by the expansion of [1]:

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1 We use the terms 'sector' and 'industry' interchangeably throughout. The input-output tables available to us are on an industry basis. Since it is demand for domestically produced goods that generates employment in the economy concerned, final demand is defined throughout as final demand for the outputs of domestic industries, with the input-output tables used also those for domestic outputs only.

2 This is the reciprocal of labour productivity when the productivity measure is gross output per worker, rather than value added; see ten Raa and Schettkat (2001).

$$\boldsymbol{N} = \hat{\boldsymbol{n}}(\boldsymbol{I} - \boldsymbol{A})^{-1}\hat{\boldsymbol{F}} \qquad [2]$$

where $\hat{\boldsymbol{n}}$ and $\hat{\boldsymbol{F}}$ contain the sectoral employment coefficients and final demands as in [1] expressed as diagonal matrices. ***N*** is now the square sector-by-sector matrix where the *ij*-th element N_{ij} is employment in (row) sector *i* generated by final demand in sector *j*. The row-sum of each *i*-th row of ***N*** gives the employment generated within sector *i* to supply its output for final use and to all intermediate users. This is the sectoral allocation of employment as conventionally measured. Each *j*-th column-sum of ***N*** gives the employment generated economy-wide for the production of the *j*-th sector's final demand. This is the VIS allocation, attributing employment to the sector of the final demand which it serves, independent of the sector in which it is located. This model is developed more fully in Appendix 2.

The allocation of employment across vertically integrated sectors is illustrated with a numerical example in Table A1. The top panel shows the input-output flows for a three-sector economy in conventional format. Employment in each sector is given in the far right column, showing sector 3 as much the largest employer. Below are the Leontief $(\boldsymbol{I} - \boldsymbol{A})$ and inverse $\boldsymbol{B} = (\boldsymbol{I} - \boldsymbol{A})^{-1}$ coefficient matrices. In the panel below the final demand and employment vectors are converted to diagonal matrices, and the matrix calculation $\boldsymbol{B}*\hat{\boldsymbol{F}}$ completed, giving the total amount of output required to sustain the given levels of final demand. The bottom panel presents the calculation of the matrix $\hat{\boldsymbol{n}}*\boldsymbol{B}*\hat{\boldsymbol{F}}$ where the quantity of output $\boldsymbol{B}*\hat{\boldsymbol{F}}$ is pre-multiplied by the diagonal matrix $\hat{\boldsymbol{n}}$ of employment coefficients to give the level of employment required in each sector to sustain the given vector of final demands. Reading along the rows, this matrix shows the level of employment required in the row industry to support each successive element in the (column) vector of final demands; industry 1 employs 7.77 workers to support final demand for its own output, 1.59 to supply intermediate inputs into the final output of industry 2, and 0.63 towards final demand in industry 3. Total employment in industry 1, supporting the final demands from all three industries, is 10 workers. The row sums of the employment matrix give back the initial within-sector employment levels. Reading down column 1 traces the employment required in sectors 1, 2 and 3 to sustain final demand for sector 1's output - 7.77, 3.60 and 27.18 units respectively. The column total of 38.56 is the employment required economy-wide to produce the 110 units of final output of sector 1. This is the employment attributed to industry 1 on a VIS basis. Summing across the column totals for the vertically integrated sectors returns the economy's total employment of 110 units.

The VIS approach through the input-output framework yields important insights into the employment requirements and their structure. Producing the final output of sector 1 generates employment of 38.56 units across the economy as a whole, the major portion of this (27.18) taking place in sector 3 and only 7.77 within sector 1 itself. Although sector 1 is much the smallest in terms of numbers employed within it, involving only 10 of the 110 unit workforce, on a VIS basis the production of its output involves more than one-third of all workers. Similarly, sector 3 is the location of most of the economy's workers, and in direct employment terms is several times larger than sectors 1 and 2; but the employment generated across the economy to produce its output, 40.73 units, is only marginally greater than the employment generated by the final output of sector 1.

While this is a hypothetical example, the main message is a general one. The employment generated economy-wide by the production of a sector's final output depends on the entire set of inter-industry relationships encapsulated in the inverse coefficient matrix ***B***, and on the employment-intensity *n*, of every sector. The resulting employment generated in the production of the sector's final output may be (much) greater or smaller than the number of jobs located within the sector itself. Since the inverse matrix is highly non-linear, any simple relation such as a (linear) correlation between a sector's relative ranking on the two measures should not be expected.

2 JOB CREATION ACROSS VERTICALLY INTEGRATED SECTORS OVER TIME AND ACROSS COUNTRIES

We now apply this approach to the six economies (US, UK, Germany, France, the Netherlands, Spain) for the period from the late 1970s to the late 1990s. The main data that we use are the standardised (domestic) input-output tables prepared by the OECD. To allow for the differing incidence of part-time work across the six economies employment is measured as far as possible on a full-time equivalent (FTE) basis. More detail on the data is given in Appendix 1.

The implication of the conventional view of services as characterized by high employment-intensity (low labour productivity) is that they create more employment per unit of final demand than manufacturing industries where labour productivity is higher. By focusing exclusively on within-sector employment this view neglects the fact that high productivity manufacturing industries are also involved in the production of services through supplying necessary intermediate goods, and vice-versa with service inputs into manufactures. The VIS approach encapsulates these inter-relations; employment is generated in intermediate as well as final production, and labour productivity depends on efficiency in labour use throughout the supply chain as well as in the final sector.

For each country we first present the VIS measure of the employment-intensity of all the individual sectors. This is calculated as the employment generated economy-wide by the injection of a standardized increment of final demand to the sector. The demand injection is made to the single industry, notionally holding final demands for all other industries at zero, to give employment created in that VIS sector. We repeat this for each sector in turn. The injection is standardized at 1 million units in the country's own currency, converted to prices of the most recent year. VIS employment then allows us to compare the number of jobs generated economy-wide by the injection to each industry. (Since on the input-output methodology each unit of final demand requires the same use of inputs we can think of this interchangeably as a unit of consumption, investment, government expenditure or export demand for the product.)

Figures 1-6 show the results from this simulation for each of the six economies for three years as available in the late 1970s, late 1980s and the second half of the 1990s. Three major results emerge. First, in each sector and country the number of jobs generated/required has been falling over time. This reflects productivity growth (bearing in mind that, in the vertically integrated industry, productivity growth reflects gains in all the supplying industries as well as within the sector itself). Second, there is considerable heterogeneity across sectors, with the most employment-intensive sectors generating twice, even three or four times, the number of jobs of the least employment-friendly. Equivalently, the production of certain outputs is achieved at three or four times the efficiency, in terms of economy-wide labour use, of the least efficient.[3] Third when using the VIS approach a manufacturing/services divide in either productivity levels or productivity gains is by no means evident. Some manufacturing industries generate high numbers of jobs, as do some service industries; on the other hand some service industries generate surprisingly few jobs. Spectacular productivity gains have been achieved in manufacturing, notably in the production of electronic goods and medical equipment, while some services, such as posts and communications, also show major gains. The laggards likewise are not exclusively the preserve of the service sector. [4]

See Figure 1 – Figure 6

To summarise the pattern of employment-intensities over time and between countries Table 1 gives the Spearman correlation coefficients for the sectoral rankings of the employment generated by the unit injections of final demand; the upper panel shows the correlations within each country over time, and the lower panel the correlations across countries in the latest

3 Implicitly we have computed for each industry a productivity index that relates output to the inputs directly and indirectly involved in its production. Our computed productivity index (the employment effect of one unit of final demand) is closely related to the deflated index of total factor productivity used in Baumol and Wolff (1984). In terms of our example in Table A1, to produce one unit of final demand of X1 takes 1.59 units of X1, 0.35 units of X2 and 0.46 units of X3. Replacing the diagonal FD matrix in the third panel by the identity matrix I, the matrix multiplication B*I gives the associated output requirements. To obtain the corresponding labour input requirements, these quantities are multiplied by (the inverse of) a value measure of productivity (7.77/110 = 0.07 labour units in industry 1, 3.60/110 = 0.03 units in industry 2, and 0.25 units in industry 3), giving a total of 0.35 labour units across the whole economy. Thus productivity, as the value of output per unit of factor input employed, would be 1/0.35 for industry 1, and similarly 1/0.25 in industry 2 (0.01 employment units in industry 1, 0.12 units in industry 2, and 0.12 in industry 3).

4 The seeming outlier for the Netherlands in Figure 5 is the industry: Other Manufacturing and Recycling. This is in part a residual category. Its share in gross output in 1977, 1986, 1997 was 0.2, 0.2, and 1.2% respectively, while its share in employment was 3.2, 2.5 and 2.3%. These relatively large changes in small numbers cause the spike in Figure 5.

year.[5] The high value of the coefficients within each country, mostly between 0.7 and 0.9, indicates that the employment-friendly industries in each country tend to remain the same over time. Across countries the pattern of relative job creation also shows a substantial degree of similarity. Moreover, the size of the correlation coefficients between countries conforms to the general idea that European economies tend to be quite similar to each other, with correlations all above 0.7, and less similar to the US, with correlations mostly lower than 0.7. Comparing the European economies individually to the US, Germany appears to be the least similar, followed by France, the Netherlands, and the UK with Spain, perhaps surprisingly, the most similar.

See Table 1

Employment at the level of the individual VIS is our basic building block. We turn now to consider some more aggregate implications.

5 To calculate the correlations over the three periods within each country we had to do a small amount of sectoral aggregation to achieve a common industry classification. Because of country specific data problems, notably the absence of some industries from individual input-output tables, we have not computed the correlation coefficients between countries for the earlier years.

3 JOB CREATION IN VERTICALLY INTEGRATED SECTORS: MANUFACTURING VS. SERVICE INDUSTRIES

Actual demand patterns have been shifting strongly towards services, as noted for all industrialized economies (see e.g. Feinstein, 1999). The scale of this shift in the six economies is shown for final demand and consumption in Table 2. The share of services has risen in every category, in some cases by as much as 16 percentage points. If services are income elastic, high-income economies will tend to consume more services. If the demand for services creates more jobs, then these economies will also tend to be high employment economies. This line of argument is sometimes put forward as an explanation of the superior employment performance of the US relative to most European economies. We first address the issue of whether, on the VIS basis, manufacturing and service outputs show systematic differences in terms of employment generated.

See Table 2

In order to asses its validity we allocate sectors into two broad groups, Manufacturing and Services, and calculate the average number of jobs created on a VIS basis by the injection of one unit of final demand into each sector in the group.[6] The results are presented in Table 3. These show clearly that there is no simple story of manufacturing generating more jobs than services, or vice versa. On average, the number of jobs generated economy-wide when final demand is allocated to Manufacturing is of the same order of magnitude as when it is allocated to Services. This result is robust both over time and across countries. Moreover, contrary to the received wisdom, in the US and the UK demand for Manufactures generates more jobs than an equal demand for Services. In the continental European economies, on the other hand, demand for Services generally generates more jobs than an equal amount of demand for Manufactures.

6 Manufacturing comprises: Agriculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC3), Public Utilities (ISIC 4), and Construction (ISIC 5). Services comprise: Wholesale Retail and Trade, Hotel and Restaurants (ISIC 6), Transport and Communications (ISIC 7), Finance, Insurance, Real Estate and Business Services (ISIC 8), and Community, Social and Personal Services (ISIC 9).

See Table 3

The concept of the vertically integrated sector stresses the important role played by the intermediate stages of production and the linkages between industries through these. As has recently been emphasized by Oulton (2001), industries with low productivity growth do not necessarily average the economy's productivity growth rate downwards towards zero. This applies only if their output is exclusively for final use. To the extent that stagnant industries produce for intermediate demand any (positive) productivity growth there adds to the productivity growth rate in the using sectors. Comparing relative growth rates of productivity in final production only may be misleading as a measure of the sector's contribution. The next step in our analysis is therefore to examine the nature and extent of this interdependence across sectors. In particular we will distinguish between the share of new jobs generated that are located within the sector receiving the demand stimulus, the share arising in other sectors within the Manufacturing or Services group, and the share that spills over between these broad groups. Table 4 shows these shares for each year and country.

See Table 4

When demand is allocated to one of the sectors within Manufacturing on average between one-half and two-thirds of the jobs created occur within the sector itself. This share has been very stable within each economy, with only the Netherlands and Spain and (marginally) the US showing a declining trend. When the demand injection is to one of the Services sectors the proportion retained is significantly higher, at around three-quarters.[7] This share has tended to fall over time in half of our countries (US, UK, and the Netherlands), while increasing in the others (Germany, France, and Spain).

The jobs not retained within the original sector spill over to the rest of the economy as encapsulated in the vertically integrated sector. Here the trends are striking. From an original

[7] Within Manufacturing we have between 19 and 26 sectors, depending on country and year, while only seven Services sectors can be distinguished. For Manufactures therefore the shares 'retained' will be smaller and the share attributed to 'within sector spillover' larger than in Services. The spillovers between Manufactures and Services are unaffected by the number of available sectors.

injection to one of the Manufacturing sectors the share of jobs spilling over to other sectors within the Manufacturing group has been tending to fall while the share located in Services has increased sharply (columns (2) and (3)). Similarly, when demand is injected into Services the spillover of jobs to Manufacturing has tended to decline, while the share of jobs generated within other parts of the Services group has increased (columns (5) and (6)). Both Manufacturing and Services have been economizing on their use of manufactured inputs and expanding their use of intermediate services. Rising spillovers to Services both from Manufacturing and from Services themselves is clearly the dominant trend.

These developments can be interpreted as showing outsourcing in various forms. The reduced spillovers within and to Manufactures are consistent with rising import penetration through the outsourcing abroad of parts of the manufacturing supply chain. The rising spillovers to the Service industries from both Manufacturing and Services are consistent with the outsourcing of functions, with firms increasingly restricting their activities to core competencies while buying in ancillary services previously provided in-house. They may, for example, no longer engage in their own recruitment, marketing, tax management, software development, cleaning, and catering, but purchase these from specialist (services) suppliers. It can be argued that, in the limit, outsourcing along these functional lines generates no additional activities (or jobs) within the economy, only changing their sectoral location. However, some efficiency gains must be expected as part of the incentive to outsource – even if, as some evidence suggests, outsourcing is not infrequently unsuccessful and subsequently reversed. A further possible source of the increasing spillovers of jobs from Manufactures to Services is that the output of manufactures not only increasingly includes elements such as branding and marketing, but also explicit post-sale service components such as maintenance contracts or financing. While the input-output approach is powerful in revealing the trends in spillovers it does not allow us to disentangle and quantify the contribution of these two trends, towards specialization and outsourcing, and for an increasing service element in goods.

We summarize our results thus far. Final demand and consumption are increasingly oriented towards Services everywhere. But a demand injection to the Service industries generates approximately the same number of jobs as an injection to Manufacturing, when these are measured on a VIS basis. Under these circumstances, a shift in final demand towards Services,

replacing Manufactures, will have a minimal effect on the level of employment. But the spillovers discussed above predict that Services are increasingly the winners even from demand for Manufactures. In both cases a decreasing share of the jobs created are located within Manufacturing while an increasing share is located within Services. As a net injection either will concentrate employment increasingly in the Service industries; this concentration will be particularly strong where the injection itself is into Services. It is these spillovers which have brought about the sharp increase in the share of Services in total employment, of between 10 and 15 percentage points, in the six economies over the past 20 years (Figure 7).

See Figure 7

4 THE EMPLOYMENT EFFECTS OF FINAL DEMAND AND CONSUMPTION MIXES WITHIN THE SIX ECONOMIES

The previous section examined the employment implications of demand for manufactures and services as aggregate categories, given the spillovers within the vertically integrated sectors. But, as pointed out in section 3, there are substantial differences in employment-intensities between individual sectors within these broad categories. This suggests that if the mix of industries in demand patterns at the more detailed level coincide with the varying employment-intensities significant differences could emerge in the employment generated by final demand or consumption overall. We therefore now look at the employment implications of the detailed demand patterns actually adopted in our six economies. The focus is on the composition of demand i.e. the mix of products purchased, when the overall level is held fixed. We will look at both total final demand and consumption. Total final demand covers all the sources that drive employment: consumption expenditure by households, current and capital expenditure by government, capital formation by firms and demands from abroad through exports, the last being a major category in the European economies, notably the Netherlands. Taking final demand as a whole also ensures that we include employment generated through healthcare and education, where the public/private split in expenditure and therefore the extent to which they appear in private consumption varies markedly across countries. We will give particular attention to the role of private consumption, the most important component of aggregate demand, and of increasing importance during the period analyzed. In addition, looking specifically at consumption allows us to follow up on the literature investigating the growth of services in consumption (Schettkat and Yocarini, 2003) by assessing the effects on employment.

We wish to examine the employment-friendliness of demand patterns both as they have evolved within each country, and as they compare across countries. The analysis is based on counterfactuals, through the construction of alternative final demand vectors (AFD). For comparisons over time the AFD is based on the country's demand mix in alternative years; for comparisons between countries it is based on the demand mix of the comparator country. More specifically, the construction of the ADF is carried out in three steps: in the first step we take the original final demand vector and introduce an alternative service mix; in the second step, we

add to this an alternative level of service share in final demand; and in the final step we further add an alternative mix of manufacturing industries.

An example from a cross-sectional comparison will clarify (for comparison over time the country suffixes are replaced by time suffixes). The objective is to compare the employment effect in the US of a different final demand mix, for instance for Germany (G). The final demand vector for the US can be partitioned into two parts, final demand for Manufactures and final demand for Services $\begin{bmatrix} FD_{US}{}^{M} \\ FD_{US}{}^{S} \end{bmatrix}$ where the upper part of the vector contains the set of Manufacturing industries (denoted by M) while the lower part contains the Service industries (denoted by S). Total final demand for US products is then the element-by-element sum across the two sub-vectors, $FD_{US} = FD_{US}^{M} + FD_{US}^{S}$. In the first step we change only the Service mix, adopting the Service mix from Germany, while leaving total final demand and the Service share unchanged. Denoting the generic industry by *i* the alternative final demand vector for step 1 AFD1 is:

$$AFD1 = \begin{bmatrix} \left(AFD1_i^M = FD_{US,i}^M \right) \\ \left(AFD1_i^S = \frac{FD_{G,i}^G}{FD_G^S} FD_{US}^S \right) \end{bmatrix}; \quad \frac{FD_{US}^S}{FD_{US}} = \frac{AFD1^S}{FD_{US}} \qquad [3]$$

where $FD_{US}{}^{S}$ denotes final demand for Services in the US. In ADF1 US demand for Services takes the German mix while retaining its US share in final demand.

The second step allows a change in the Services share in final demand:

$$AFD2 = \begin{bmatrix} \left(AFD2_i^M = \frac{FD_{US,i}^M}{FD_{US}^M}\left(1 - \frac{FD_G^S}{FD_G}\right) FD_{US} \right) \\ \left(AFD2_i^S = \frac{FD_{G,i}^S}{FD_G^S}\frac{FD_G^S}{FD_G} FD_{US} \right) \end{bmatrix} \quad [4]$$

AFD2 retains the US level of final demand FD_{US} but now applies the German share of Services as well as its sectoral mix. Note that the overall share of Manufactures also has to adjust, although the individual industries retain their US share within it.

Finally, in step 3 the German Manufacturing mix replaces the structure of US Manufacturing to give ADF3:

$$AFD3 = \begin{bmatrix} \left(AFD3_i^M = \frac{FD_{G,i}^M}{FD_G^M}\left(1 - \frac{FD_G^S}{FD_G}\right) FD_{US} \right) \\ \left(AFD3_i^S = \frac{FD_{G,i}^S}{FD_G^S}\frac{FD_G^S}{FD_G} FD_{US} \right) \end{bmatrix} \quad [5]$$

With all the 'mix' changes applied the generic element of AFD3 can be re-written as $AFD3_i = \frac{FD_{G,i}}{FD_G} FD_{US}$. This completes the transformations.

These three alternative final demand vectors are then combined with the US Leontief inverse and the US labour coefficient matrix to obtain a counterfactual estimate of the US employment under the alternative final demand mixes.

We use the transformation of the final demand vector described above for two sets of exercises. First we investigate how the evolution of demand patterns within each country has influenced its employment outcomes. The simulations for this involve the introduction, in the three steps outlined above, of the country's final demand mix of the late 1970s into its vector of final demands in the late 1990s. This is carried out, within each country, at both current and constant prices. The results are reported below. The second set of simulations, reported in the next Section, exploits the cross-country variation in the final demand mix. Again the final demand vectors are transformed stepwise, with the country's own demand pattern replaced by the successive dimensions of demand in the comparator country. It should be emphasized that in both sets of exercises only the demand patterns change; the countries' own production structures (Leontief inverse) and employment coefficients of the late 1990s are retained throughout.

Table 5 shows the results of the time-series exercise for each country. The 'Total' column of the left panel in Table 5 can be interpreted as the difference that would have emerged in the employment level of the late 1990s had the final demand mix remained as it was in the late 1970s. A positive figure implies that employment would have been higher i.e. that changes in the demand mix have not been employment-friendly. [8]

See Table 5

For the European economies the changes in the final demand mix over the period have been employment-friendly (i.e. the demand mix of the late 1970s would give lower employment than

[8] In these and the further counterfactual simulations below it is assumed that the supply of all inputs, capital and all types of labour is elastic so that any increase in demand can be accommodated by the existing technology. The presence of bottlenecks and of frictions that could hamper the smooth flow of resources between industries is also ruled out.

resulted from its actual mix in the late 1990s). And in most cases the employment-friendliness has been substantial, with an implied employment increase of over 12% for Germany[9] and 10% for the Netherlands. The US stands in contrast, as the only economy where the pattern of demand changes has had an adverse effect on the level of employment; however this effect is small. Taking the sources of change separately, the changing mix of demand within Services (step 1) has contributed to higher employment in each country except the US. In the case of Germany the contribution has been particularly large (11%). The increase in the share of Services overall in final demand has reinforced this everywhere, creating more employment in each economy (step 2). The changing mix of Manufacturing industries, on the other hand, has tended to reduce employment, except in the Netherlands, although the effects are not large (step 3). While the overall effects vary somewhat in magnitude it is clear that the changing patterns of demand, particularly towards and within Services, have contributed significantly to employment growth in Germany, the Netherlands, the UK and France, while working marginally against it in the US. This is clearly counter to the hypothesis that the increasing service-orientation of the US economy has brought about its higher employment rate.

Employment growth over this period has proceeded at very different rates in the individual economies, notably between the US and the European economies. It is therefore useful to evaluate the impact of these shifts in the final demand mixes against the overall employment growth achieved within the country. In the US total employment increased by over 36 million FTEs over the 20 years; this represents an increase of 50% over its 1977 level, an annual compound growth rate of 2%. Against this the (negative) contribution of the demand mix is clearly trivial, equivalent to 5% of the employment growth which actually occurred over the period, or less than the average growth in a single year. In the European economies employment growth has been much lower, enhancing the significance of the positive effects of the changing demand mix on employment there. Using the results from the counterfactuals at current prices, changes in the mix of final demand, notionally at an unchanged level, contribute the equivalent of one-third (36%) of the employment growth realised in Germany, 43% in the Netherlands, and 25% in Spain. In the UK final demand at an unchanged mix would have had a negative impact on employment, equivalent to a loss of 1.2 million FTE jobs over the period; but that has been more than offset by the effects of the changing demand mix, which contributed a gain of 1.8

[9] The former East Germany is included in the 1997 input-output table for Germany but not in the earlier ones. Since the analysis deals only with changes in 'mix' it is not affected by the size of the economy. However, re-unification does imply that the changes in 'mix' are larger than would otherwise have occurred.

million workers, giving a net employment growth of 0.6 million workers over the whole period. France presents an exceptional case, as the only country to have experienced negative employment growth, a net loss of 0.4 million workers over the period as a whole. Final demand at its 1977 mix would have driven down the level of employment by 1.6 million workers, while the shift in the mix, increasing employment by 1.2 million, provided only a partial offset. For the European economies, therefore, against the background of their sluggish employment growth, the shifting mix of final demand has made a relatively important contribution. But for the US, where employment growth has been buoyant, the contribution has been unimportant.

The composition of the alternative demand vectors and therefore their effect on employment is influenced by the changes in the relative price of products over time. Relative prices tend to rise in industries with lower productivity growth; to the extent that demand has also been growing more rapidly there, e.g. in Services, the two effects will be mutually reinforcing, increasing the demand share. When the analysis is re-run at constant prices (right panel in Table 5) the employment-friendliness of demand shifts for the European economies remains. In Germany relative prices have had no additional effect, and the strong impact of the demand shifts is unaltered. The UK and France show a reduced effect, as might be expected, but in the Netherlands the estimated effects are strengthened, mainly due to the shifts in the Manufacturing mix. After controlling for relative prices the changing demand mix has no effect on employment in the US; the effect of each of the individual shifts is small, and in the aggregate offsetting.

Table 6 shows the results of the same analysis applied to household consumption. The figures given are the percentage changes in the employment generated by consumption expenditure. They can be converted to changes in total employment by multiplying by the share of total employment generated by consumption (US 0.7, UK 0.5, Germany 0.46, France 0.48, the Netherlands 0.33, and Spain 0.53). [10]

See Table 6

[10] The percentage changes in the total employment of the late 1990s attributable to the changing consumption mix, at current prices, would be –0.81, 1.1, -1.45, 1.8, 0.43 and 0.27 in the US, UK, Germany, France, the Netherlands and Spain, respectively.

Strikingly, in the case of household consumption the changes in mix have been much less employment-friendly for the European economies than the changes in final demand overall. Only in Germany (and very marginally Spain) has the effect been positive at all. For France, the UK and the Netherlands the change in the consumption mix has been employment-reducing. Only the rising overall share of Services in consumption has had a universally positive effect on employment. The changing mix within services has reinforced this in Germany, but in the UK, France and the Netherlands the changing mix within Services and within Manufacturing have more than offset this, to give a lower level of employment overall. The US has gained employment from the changing consumption mix, but very modestly. The shifts within the Service mix (at current prices) has reduced the employment sustained by consumption activities everywhere except in Germany, and the shift in the Manufacturing mix has reduced it everywhere (except, marginally, in the Netherlands). Eliminating relative price changes reverses the (still small) effect for the Netherlands and strengthens the employment-friendliness in the shift in the US. However, it also exacerbates the employment-unfriendliness of the changing consumption mixes in the UK and France.

5 THE EMPLOYMENT EFFECTS OF DEMAND AND CONSUMPTION MIXES ACROSS ECONOMIES

The previous Section established that, although the changing consumption mix has tended to retard the growth of employment in the European economies, the changing mix in final demand has had a much stronger positive effect. So the evolution of demand patterns within the individual countries does not explain the superior US employment performance over the period. We turn now to consider whether the US patterns of final demand and consumption are more employment-friendly than in the European economies. In other words, has the evolution of the US into a service economy given rise to its higher employment rates?

To analyse this we have run two sets of counterfactual analyses. Firstly we assess the (counterfactual) implications for employment in the US of the mixes in final demand and consumption which characterize the various European economies. Then we assess the employment implications for each European economy of the alternative US final demand and consumption patterns. For the counterfactual for the US the final demand (or consumption) vector characterizing one of the European countries is combined, at the US level of final demand, with the US inter-industry and employment structures (the Leontief inverse and labour coefficients vector) to estimate the change implied for US employment by the European demand patterns. In the counterfactuals for the European economies the simulation is run in the reverse direction, applying the US demand pattern to each of the European economies (see equations [3] - [5] above).

The estimated impacts of the European structures of final demand on US employment are presented in Table 7. Looking first at the total effect (column (4)), far from being employment-unfriendly, the final demand mixes of the each of the European economies would generate higher levels of employment in the US. The effect is particularly strong for the demand patterns of France and the Netherlands. The main contribution to this comes from the mix within Services; employment in the US would be over 7% higher with the French pattern of demand for Services (column (1)). On the other hand, evidence in support of the handicap to employment in Europe from the lower share of Services overall in final demand emerges in column (2).

Employment in the US benefits from its orientation as a service economy. But even the least favourable pattern, the UK one, would reduce US employment by only 2.4%. The more favourable product mix within both Services and Manufactures in the European economies more than offsets the limitation to their employment arising from the lesser share of Services relative to the US.

See Table 7

Next we run the counterfactual in the reverse direction, applying the US final demand pattern to each of the European economies. The results, presented in Table 8, largely endorse the previous findings. Applied in a European context the US final demand pattern would result in a consistent, and significant, loss of employment. Germany and Spain would be particularly adversely affected, with reductions of around 9%. The US Service mix alone would cost each of the European economies at least 5% of its employment (10% in Germany), although this would be partly offset by employment gains from the higher US Service share in final demand and the US Manufactures mix. The overall result, however, remains clearly and strongly adverse to employment.

The positive employment effect of the European Service mix in final demand derives predominantly from the higher shares of Community, Social and Personal Services, and Education in European demand patterns. Both of these industries rank in the top three most employment intensive industries. The US, on the other hand, has a higher share of its final demand for Services in Health and Social Work, in Hotels and Restaurants, and in Post and Telecommunications, the last two of which are markedly less employment intensive.

See Table 8

The final possibility remains that the choices of the US consumer, in terms of the mix within the consumption basket, may explain the higher US level of employment. Again we analyse this firstly applying the five cross-country counterfactuals to the US, re-distributing US consumption using the alternative country's consumption mix of the late 1990s. As above, this alternative consumption vector is combined with the US Leontief inverse and labour coefficient matrices.

The results are shown in Table 9, where the upper panel shows the employment effect of alternative consumption mixes expressed as percentage of the employment level sustained by consumption activities in the US and the lower panel scales to percentages of total employment. The results are also illustrated in Figure 8 which shows the change to US employment which would result from the consumption mix of the country on the horizontal axis.

Table 9 provides some evidence in support of the superior job creation ability of the US consumption mix. Except for the UK, the European economies have a less employment-friendly pattern of consumption. For instance, if the US had the French consumption mix the employment generated by consumption would drop by 7.5%; since consumption accounts for 67% of total employment (net of production of government services) US employment would be around 5% lower, and the US employment to population ratio of 74% would be reduced by 3.9 percentage points. On the German pattern US employment from consumption would fall by 5.3%, total employment by 3.6% and the employment to population ratio by 2.7 percentage points. Since the gap in employment to population ratio to the US in the mid 1990s is 15 percentage points for France and 10 for Germany, for these countries around one fourth of the employment gap can be notionally attributed to the different private consumption mixes. The UK, on the other hand, gains nothing in employment terms from its consumption pattern, and Spain gains little.

See Table 9

See Figure 8

Reversing the direction of the counterfactual, we now apply the US private consumption mix to the consumption levels in each European country, retaining their production structures. The results are shown in Table 10 and illustrated in Figure 9. The estimated employment change is expressed in the upper panel relative to the level sustained by the country's own consumption activities and in the lower panel relative to its total employment. Again the superiority of the US consumption mix in terms of employment is evident. The US consumption mix would increase the employment generated by private consumption in each of the European economies by

between 6 and 10%, except in Spain where it would reduce it by around 7%. It is the mix of Services within US consumption which is particularly employment-friendly, with a further positive, but smaller contribution coming from the Services share in US consumption.

See Table 10

See Figure 9

Again, in order to convert the growth rates of employment generated by consumption into growth of total employment we adjust these changes by the share of total employment attributable to consumption (UK 48%, Germany 44%, France 46%, Netherlands 29%, and Spain 52%; the respective employment to population ratios are: 0.71, 0.65, 0.59, 0.60, and 0.48). The employment to population ratio rises by 2.1 percentage points in the UK, 1.8 in Germany, 2.6 in France, and 1.8 in Netherlands, while in Spain it is reduced by 1.8 percentage points. Thus, everything else constant, if European economies were to adopt a US-type consumption mix the UK could halve its (small) employment gap with the US, France and Germany could reduce theirs by one-fifth, the Netherlands would reduce its gap marginally, while the gap between the US and Spain would widen.

We conclude this Section by emphasising the contrasting messages about the implications for European as against US employment deriving from the analysis of the final demand mix on the one hand and the consumption mix on the other. The consumption mix in Germany and France can be seen as contributing a minor but nonetheless noticeable part of their employment gap with the US – one-quarter or one-fifth, depending on the direction of the counter-factual; the same applies in a much more modest way to the UK and the Netherlands, while the reverse holds in Spain. On the other hand, the final demand mix in the European economies is unambiguously employment-enhancing. Since consumption contributes a significant part of the employment generated by final demand a focus on the employment effects of consumption alone on the employment gap does not seem appropriate. We therefore turn now to considering the issue from a wider perspective.

6 THE SOURCES OF EMPLOYMENT CHANGE IN THE VERTICAL INTEGRATED SECTOR

The analysis in the Sections above centred on estimating the effects on employment of demand, both level and mix, taking as given the structure of inter-industry relations and the employment requirements in each sector. In this Section we bring these further aspects explicitly into the analysis, extending the decomposition of the sources of employment change to identify and measure the relative contributions of final demand, changes in the inter-industry linkages, and labour productivity growth.

Returning to the formulation of employment within the VIS in equation [2] above, differencing allows us to decompose the change in employment between two periods among the growth of final demand, changes in the inter-industry linkages, and the growth of labour productivity:

$$\Delta \boldsymbol{N} = \hat{\boldsymbol{n}}\,\boldsymbol{B}(\Delta\hat{\boldsymbol{F}}) + \hat{\boldsymbol{n}}(\Delta\boldsymbol{B})\hat{\boldsymbol{F}} + (\Delta\hat{\boldsymbol{n}})\,\boldsymbol{B}\,\hat{\boldsymbol{F}} \qquad [6]$$

where $\boldsymbol{B} = \boldsymbol{(I - A)^{-1}}$, with $\Delta\boldsymbol{B}$ measuring structural change in production relations, and $\Delta\hat{\boldsymbol{n}}$ the change in within-sector labour requirements per unit of gross output i.e. the reciprocal of labour productivity measured on a gross output basis.[11] It should be noted that $\Delta\boldsymbol{F}$ subsumes the effects both of the changing level and the changing mix of final demand, which we will refer to simply as the change in final demand.

Since equation [6] differences a three-way product six variants, with differing combinations of initial and end-year values, are all formally correct (see Appendix 4). We follow Dietzenbacher and Los (1998) in using the average of the two polar variants, involving initial and end-period values respectively. Dietzenbacher and Los show, in an extended empirical analysis based on detailed input-output data for the Netherlands, that the average of the two polar

[11] For further discussion of the measurement of labour productivity on this basis see ten Raa and Schettkat (2001). The problems of measurement affecting productivity in the service industries have been widely examined (Triplett and Bosworth 2001; Gordon, 1996; Griliches, 1992).

decompositions appears to be remarkably close to the average of the full set of decompositions. In the present case a further significant advantage of using the polar variants is that it allows us to obtain the decomposition without having to deflate the input-output tables.

As with equation [2], each term in equation [6] is measured in units of FTE employment. The direct route to implementing the decomposition would be to express each of the contributing elements of ***F***, ***B*** and ***n*** in 'real' (constant price) terms. We propose a novel strategy to achieve the same result without explicit deflation. We first note that the employment generated in equation [2] is not affected by the price basis used in measuring ***F*** and ***X***; as a 'real' outcome employment is determined by 'real' final and intermediate demands (see Appendix 3). This can be extended to the polar decompositions of equation [6]. The characteristic of the polar decompositions is that two of the three terms within each variant contain only a single price unit. In polar variants [A] and [B] in Appendix 4 these are the first and third terms. In [A] in the first term ***B*** and ***F*** are both in 1990 prices while in the third term ***B*** and ***n*** are both in 1970 prices. By measuring $\Delta \boldsymbol{n}$ in 1990 prices and $\Delta \boldsymbol{F}$ in 1970 prices we obtain measures of their contribution to employment change in [A] which are independent of the price base. Since $\Delta \boldsymbol{N}$ on the left-hand side is also in FTE units and the decomposition is exact the problematic term in $\Delta \boldsymbol{B}$ can be derived as residual. The decomposition is now effectively at constant prices (price-free) and can be used to quantify the relative contributions of demand, production structures and labour productivity to employment growth.

The sources of employment change in each of the six economies over the period from the late 1970s to later 1990s as revealed through these decompositions are shown in Figure 10a in terms of employment FTEs, and as percentage contributions in Figure 10b. The backdrop is the diverse record of employment growth across the six countries - an average annual increase of 2.03% in the US, the Netherlands as the best of the European economies at 1.3%, the UK and Spain with positive but rather small growth rates of 0.13% and 0.61% respectively, while in France employment declined by 0.14% per year on average; the increase in Germany, equivalent to an average annual growth rate of 2.53%, combines employment growth in the old West with the inclusion of the former East Germany, which added around 10% to total employment in the 1990s.

See Figures 10a and 10b

The decompositions reveal clearly that aggregate employment changes are the outcome of a two-way dynamic. In each of the economies the growth of final demand generates employment expansion, but this is offset by employment losses due to productivity gains down the supply chain (the VIS).[12] The contribution of structural change, via input-output linkages, is small everywhere. In the US, where employment expanded by over 35 million FTEs over this period, the growth of final demand generated the equivalent of 60 million FTE jobs, with a further 4 million from the changing inter-industry structure, while 28 million were eliminated by productivity growth. By contrast, in the UK, France, the Netherlands and Spain labour productivity gains almost exactly offset the employment expansion generated by demand growth, leaving FTE employment almost unchanged.

Figures 11–16 show the decompositions by major sector, again on the VIS basis, for each of the six economies. The same dynamic applies widely. For 'Manufactures' (i.e. non-service products) only in the US and Germany has growth in final demand generated more jobs than have been eliminated by the labour productivity gains achieved throughout their supply chains.[13] In the Netherlands and Spain the changing pattern of inter-industry linkages in the supply of Manufactures has been on balance job-creating, generating a significant number of additional jobs in conjunction with demand growth to balance the employment losses from rising labour productivity. The UK and France, on the other hand, have seen falls in the employment generated by 'Manufactures' as the expansion of demand has been weak relative to productivity growth while changes in input use along the supply chain have been on balance job-destroying.

See Figure 11 – Figure 16

Within Services the big impetus to employment change has come from Community, Social and Personal Services, Wholesale and Retail Trade, and Real Estate and Business Services. The same

12 In this context the effect of demand subsumes both the change in level and the change in mix. However, since the analysis above indicated that the effect of mix to be small it is clear that growth in the level predominates.

13 The employment change in Germany consequent on reunification particularly enhanced the role of Manufacturing.

pattern of offsetting roles for demand and productivity changes is repeated, but with two significant differences. Firstly, the balance between the job creation and job loss is now typically positive, with the employment expansion from demand growth outstripping the reductions due to productivity gains. Secondly, in a significant minority of cases productivity gains over this period have been small, on occasion even negative. The most striking instance is in the provision of Community, Social and Personal Services in the US where on average labour productivity was falling;[14] further instances can be noted in Germany, France, the Netherlands and Spain.

Structural change, measured by changes in the inter-industry linkages (Leontief inverse) plays at most a very small role in employment change. This contradicts the hypothesis that the observed growth in service employment is primarily due to outsourcing, as non-service employers replace in-house provision of intermediate services by outside purchasing down the vertical integrated sector.[15] Minor exceptions to this are the UK and the Netherlands. In the UK these structural changes are concentrated in the Business Services, Financial and Insurance Services, and Distributive Trades, and mostly during the 1980s, a period of significant economic transformation under Prime Minister Thatcher (Greenhalgh and Gregory, 2001; Card and Freeman, 2002). In the Netherlands most of the change in the inter-industry linkages is observed during the 1990s mainly affecting Business Services.

The analysis so far has looked at final demand in the aggregate. We have seen in previous Sections that private consumption can behave differently from final demand as a whole. We therefore now focus on the decomposition of employment changes due to household consumption. The results for this are given for the six countries individually in Figures 17 – 22.

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14 Negative productivity growth in some US service industries in the period 1973 – 1987 has also been found in Appelbaum and Albin (1990).

15 Similar findings have begun to emerge elsewhere. ten Raa and Wolff (1996) find that growth in manufacturing TFP is due mainly to input saving (in capital and labour), with a much smaller part due to outsourcing. Gregori (2000) in his analysis of a time series of Italian input-output tables for the period 1960 – 1985 also finds that changes in the inter-industry linkages (outsourcing) play only a minor role in the growth of service employment. Heshmati (2003) in his survey reports that managers tend to overestimate the cost reduction aspects of outsourcing; moreover,he finds that outsourcing is often a consequence of output growth.
However, it should be noted that intermediate demand for Business Services may be underestimated. The purchase of software, previously treated as the purchase of an intermediate good, is now classified as investment and excluded from the input –output table. This change of classification would underestimate the shift towards the use of Business Services.

See Figures 17 – 22

The analysis of consumption brings the role of Services to centre stage, and accentuates the findings on the relative roles of demand growth and productivity gains that emerged in the analysis of final demand. The growth in consumer demand for Services has made a major contribution to employment generation. Although their relative importance varies somewhat, the same sectors tend to come to the fore in each economy: Wholesale and Retail Trade; Community, Social and Personal Services (except in the Netherlands and, to a lesser extent, the UK); Real Estate and Business Services. The contribution of Hotels and Catering (in the tourist industries) is particularly notable for Spain. The European economies show striking gains in labour productivity which are not paralleled in the US, except in Wholesale and Retail Trade. In the majority of cases demand growth has been sufficient to absorb these productivity gains while increasing employment overall. There are, however, some conspicuous exceptions, notably Community, Social and Personal Services in the Netherlands and France, reflecting the increasing role for the public sector in these sectors during this period (see also Schettkat and Damen, 2003), and Wholesale and Retail Trade in France and Spain. As would be expected, 'Manufactures' play a much smaller role in consumption than in final demand as a whole. More strikingly, consumer demand for Manufactures has been a significant source of net job loss everywhere. In terms of job generation Manufactures have been caught in a double whammy; the shift of consumption in favour of services has led to weaker demand growth at the same time as Manufactures have been delivering strong productivity gains along their supply chains.

We now summarise the insights into the US-EU employment gap which can be gained from the decompositions. In the US the employment-creating effects of demand growth have been strong relative to the job-destroying effects of labour productivity gains. Employment creation has been mainly supported by consumption, (except in 'Manufactures'); the strength of demand growth and relative weakness of productivity gains are each particularly striking in supplying the consumer. In the case of both demand growth and productivity the effects have been heavily concentrated in a relatively narrow range of sectors. Three areas of final output have provided the bulk of the employment growth: Wholesale and Retail Trade, Community, Social and Personal Services, and Real Estate and Business Services. Demand growth in these three sectors through their VIS supply chains has created 28.5 million new FTEs out of a total increase of 36

million over the period. Labour productivity growth, with its job-destroying effects, has been principally concentrated in only two sectors (again on the VIS basis, including the supply chain): the production of 'Manufactures', and Wholesale and Retail Services; productivity gains in delivering these outputs have eliminated 27.8 million FTE jobs, while the effects of productivity were approximately employment-neutral (-0.2 million FTEs) across the remaining sectors. Wholesale and Retail Trade thus play an exceptional dual role in this dynamic, also found from a different perspective by Foster, Haltiwanger and Krizan (2002) The effects of changes in the inter-industry linkages are present but small. The European economies, in contrast, show more muted employment gains from demand growth and markedly stronger employment losses in the VIS. Both the gains from demand and particularly the losses from productivity are more widely dispersed across VIS sectors. Changes in the inter-industry linkages, including outsourcing, are only occasionally a significant part of the explanation of employment change, notably in the UK and the Netherlands. The division of demand between employment expansion and labour productivity gains is by far the more important determinant of relative employment outcomes.

7 CONCLUSIONS ON THE ROLE OF SERVICES

The conclusions from our analysis can now be summarized.

Services have been becoming progressively more important in modern economies, as demand patterns are increasingly oriented towards services and employment is increasingly concentrated there. We find that the conventional wisdom concerning the greater employment-intensity of services is not borne out when this is measured on the basis of the vertically integrated sector, encapsulating jobs generated throughout the supply chain. On the VIS basis the employment-intensities of services and manufacturing are broadly equal. Nevertheless, there is a substantial heterogeneity at the level of the individual industry, which tends to persist over time. This gives rise to the possibility that differing product mixes selected within individual countries could affect overall employment.

The employment advantage of the US relative to the European economies as a group cannot be attributed to the product mix in final demand. The evolution of the product mix has been employment-neutral in the US, and employment-friendly for the European economies. The final demand mixes of the UK, the Netherlands and Spain would generate higher employment in the US than its own pattern. Only the demand patterns of France and Germany would reduce it, and then only marginally. Conversely, if the European economies were to be characterized by the US demand mix, lower employment would result.

When the focus is restricted to the behaviour of the consumer some effects of consumption mix on relative employment can be found, although these are for the most part limited in scale. The evolution of the consumption mix, with the growing role of services, has been friendly to employment in the US, but has contributed only 3% of the growth of employment attributable to consumption over the period. Among the European economies, it has been significantly employment-friendly in Germany (contributing 9% of the employment growth attributable to consumption there) but has reduced employment in the UK, France and the Netherlands. The consumption patterns of France, Germany and the Netherlands would reduce employment in the US by between 2.6 and 5.1%, although the pattern from the UK would marginally increase it. The clearest counterfactual finding is that the US consumption mix would increase total

employment in each of the European economies (except Spain). The increase would be between just under 3% in Germany and the UK and 4.5% in France.

However, while product mix within final demand or consumption has very limited implications for relative employment between the US and the European economies, other powerful insights into the sources of employment growth emerge through the framework of the VIS sector. Decomposing employment growth among changes in demand (level and mix), labour productivity and structural change in inter-industry relations highlights the dynamic for each country between the job-creating effects of demand growth and the job-destroying effects of productivity growth. A systematic difference emerges between the US and the European economies, with the high rate of employment growth in the US attributable to high demand growth relative to productivity growth. The European economies, on the other hand, reveal a different balance, with relatively lower demand growth and a bias towards more widespread productivity gains. This dynamic offers a persuasive perspective on the US-EU employment gap.

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APPENDIX 1: THE DATA

Input Output Tables

The input–output tables used have been obtained from the OECD. These are constructed from national sources, harmonised by OECD. They are designed as far as possible to be on an industry x industry basis at basic prices. Tables for 1970-90 are on ISIC rev.2; those for 1995-98 are on ISIC rev. 3. The Spanish domestic tables prior 1995 have been obtained from the Spanish Bureau of Statistics.

We have used the domestic tables at current prices.

Detailed documentation for the tables is available at www.oecd.org.

The United States

Table for 1997:

Industries C (State and Local Government Electric Utilities) and E (Other State and Local Government Enterprises) have been combined with Producers of Government Services.

Industry D (State and Local Passenger Transit) has been combined with Transportation.

Germany

Tables for 1978-90 do not distinguish the following sectors:

Drugs and medicines (ISIC 3522) (included in Industrial Chemicals)

Radio, Television and Communications Equipment (ISIC 3832) (included in Electrical Apparatus n.e.c)

Other Transport Equipment (ISIC 3842 + 3844 + 3849) (included Metal Products and Motor Vehicles)

Table for 1995 does not distinguish the following sectors:

Pharmaceuticals (ISIC 2423) (included in Chemicals)

Non ferrous metals (ISIC 2720 + 2732) (included in Basic Metals)

Aircraft and Spacecraft (ISIC 3845) (included in Ship Building)

Other Transport Equipment (ISIC 352 + 359) (included in Ship Building)

France

Tables for all years:

Real Estate and Business Services (ISIC 83) (included in Finance and Insurance in 1972 and 1977) have been combined for all years.

The Netherlands

Tables for 1972-90 do not distinguish the following sectors:

Non-ferrous Metals (ISIC 372) (included in Basic Metals)

Radio, Television and Communications Equipment (ISIC 3832) (included in Electrical Apparatus n.e.c)

Aircraft and Spacecraft (ISIC 3845) (included in Other Transport Equipment).

Table for 1997 does not distinguish the following sectors:

Non-ferrous Metals (ISIC 2720 + 2732) (included in Basic Metals)

Pharmaceuticals (ISIC 2423) (included in Chemical Products)

Tables for all years:

Community, Social and Personal Services and Other Producers (not distinguished for 1997) have been combined for all years.

Spain

Table for 1995 does not distinguish the following sectors:

Non-ferrous Metals (ISIC 2720 + 2732) (included in Basic Metals)

Three separate sectors for Research and Development have been aggregated (ISIC 73)

Price deflation

US

The deflator for final demand for the following industries has been imputed from the deflator for the relevant 2-digit industry:

Chemicals excluding Pharmaceuticals (Chemical Products)

Pharmaceuticals (Chemical Products)

Machinery and Equipment n.e.c. (Electrical and Optical Equipment)

Office, Accounting and Computing Machinery (Electrical and Optical Equipment)

Electrical Machinery and Apparatus, nec (Electrical and Optical Equipment)

Radio, Television and Communication Equipment (Electrical and Optical Equipment)
Medical, Precision and Optical Instruments, Watches and Clocks (Electrical and Optical Equipment)

Germany

The deflators for final demand have been derived from the STAN data base (reference year 1995). The deflator for Basic Metals is missing and has been replaced with the deflator at the one digit level (manufacturing)

France

The deflators for final demand have been derived from the STAN data base (reference year 1995) adjusted to 1996. Missing data for mining industry have been imputed from figures constructed by O' Mahoney for the NISEC02 dataset at www.niesr.ac.uk
The deflator for final demand for the following industries has been imputed from the deflator for the relevant 2-digit industry:

Chemicals excluding Pharmaceuticals (Chemical Products)
Pharmaceuticals (Chemical Products)
Office, Accounting and Computing Machinery (Electrical and Optical Equipment)
Electrical Machinery and Apparatus, nec (Electrical and Optical Equipment)
Radio, Television and Communication Equipment (Electrical and Optical Equipment)
Ship Building and Repairing (Other Transport Equipment)
Aircraft and Spacecraft (Other Transport Equipment)
Railroad Equipment and Transport Equipment n.e.c. (Other Transport Equipment)

Value added in Mining and Quarrying has been derived from the input–output tables. The output deflator for 1977 was not available; 1980 has been used.

NL

The deflator for final demand for the following industries has been imputed from the deflator for the relevant 2-digit industry:

Office, accounting and computing machinery (Electrical and Optical Equipment)

Electrical Machinery and Apparatus, nec (Electrical and Optical Equipment)
Radio, Television and Communication Equipment (Electrical and Optical Equipment)
Medical, Precision and Optical Instruments, Watches and Clocks (Electrical and Optical Equipment)
Ship Building and Repairing (Other Transport Equipment)
Aircraft and Spacecraft (Other Transport Equipment)
Railroad Equipment and Transport Equipment n.e.c. (Other Transport Equipment)

Employment

UK

All employment figures have been adjusted to include self-employment. Where only employees are available, these have been scaled by the ratio including self-employment at the next level of aggregation.

France

Employment is allocated between Producers of Government Services and Community, Social and Personal Services according to industry gross output.
In 1972 Producers of Government Services are not distinguished; employment has been allocated using 1977 weights.

The Netherlands

Where industry employment is not available at the required level of disaggregation this has been estimated from the employment at the next higher level of aggregation using gross output allocators.

APPENDIX 2: THE INPUT – OUTPUT SYSTEM

Consider the standard input–output system consisting of n industries, which can be partitioned into two subsystems 1 and 2, which contain m and s industries respectively[16]. The economy can then be represented as follows:

$$\begin{bmatrix} GO^1 \\ GO^2 \end{bmatrix} = \begin{bmatrix} A^{11} & A^{12} \\ A^{21} & A^{22} \end{bmatrix} \begin{bmatrix} X^1 \\ X^2 \end{bmatrix} + \begin{bmatrix} F^1 \\ F^2 \end{bmatrix}$$

GO is a (m+s x 1) vector that denotes the gross output produced by each industry, A denotes the matrix of input-output coefficients, whose generic element is defined as: $a_{ij} = X_{ij}/X_j$. The direct coefficient matrix A is partitioned in four sub-systems each identified by a superscript. The subsystem identified by the superscript 11 (22) summarises the interaction within the subsystem itself, and the one identified by the superscript 21 (12) summarises the interactions between the sub-systems. F represents the (m+s x 1) vector of final demands (assumed to be positive) also partitioned in the two sub-systems 1 and 2.

This system can be solved to yield the gross outputs needed to sustain a given level of final demand:

$$\begin{bmatrix} GO^1 \\ GO^2 \end{bmatrix} = \begin{bmatrix} B^{11} & B^{21} \\ B^{12} & B^{22} \end{bmatrix} \begin{bmatrix} F^1 \\ F^2 \end{bmatrix}$$

where B denotes the Leontief inverse [$B=(I-A)^{-1}$].

[16] Sub-systems 1 and 2 can be thought of as manufacturing and services.

Following Momigliano and Siniscalco (1982), the vector of final demand F is to be transformed into a block diagonal matrix whose elements (on the main diagonal) are the final demand directed to a given block (either services or manufacturing):

$$\begin{bmatrix} GO^{11} & GO^{12} \\ GO^{21} & GO^{22} \end{bmatrix} = \begin{bmatrix} B^{11} & B^{21} \\ B^{12} & B^{22} \end{bmatrix} \begin{bmatrix} F^{1} & 0 \\ 0 & F^{2} \end{bmatrix}$$

The GO matrix now represents a set of vertically integrated sectors (Pasinetti, 1973). GO^{11} denotes the manufacturing (sector 1) output needed to sustain final demand directed to manufacturing. GO^{21} represents the service (sectpr 2) output needed to support manufacturing final demand (directly and indirectly). GO^{12} represents the amount of manufacturing output needed to support final demand for the service industries, and finally GO^{22} represents the service output needed to support service final demand.

The matrix GO can be converted into employment units by applying the relevant labour productivity measure. This is summarized in the labour requirement matrix N (m+s, m+s), which provides the number of workers required per unit of gross output produced. This is a diagonal matrix, with generic element on the main diagonal expressed as $n_{jj}=N_j/GO_j$, where N_j is the employment in industry j; off-diagonal elements are zero. Pre-multiplying by the labour requirement matrix gives the employment matrix N:

$$\begin{bmatrix} N^{11} & N^{12} \\ N^{21} & N^{22} \end{bmatrix} = \begin{bmatrix} n^{1} & 0 \\ 0 & n^{2} \end{bmatrix} \begin{bmatrix} B^{11} & B^{12} \\ B^{21} & B^{22} \end{bmatrix} \begin{bmatrix} F^{1} & 0 \\ 0 & F^{2} \end{bmatrix}.$$

The employment matrix N has several useful features. Its elements are expressed in the same unit of measurement – number of workers –and can therefore be summed.[17] The total of the number of workers down the columns ($N^{12}+N^{21}$) reflects the employment directly and indirectly

[17] Furthermore, the labour requirement matrix N can be derived from input-output tables at both current and constant prices. The elements of the Leontief inverse B are pure numbers; final demand and gross output are both in the same prices, thus cancelling out the price basis (see Appendix 3).

generated by final demand for manufactured goods (subsystem 1). This is the employment in the vertically integrated sector corresponding to subsystem 1.

Summing employment along the rows ($N^{11}+N^{21}$) we obtain the subsystem 1 employment generated by final demand (to both subsystems 1 and 2). Generally speaking, ($N^{11}+N^{21}$) and ($N^{11}+N^{12}$) will differ. Nevertheless, the total employment in the economy will be the same whether it is obtained by summing of the column totals or the row totals.

APPENDIX 3: ON THE INDEPENDENCE OF THE EMPLOYMENT MATRIX FROM THE PRICE LEVEL

To show this, we again use a closed input-output system, similar to the one used in Appendix 2. Each nominal entry X_{ij} is now split into its two components, a quantity q, and its price p.

We will consider two goods only, with prices p_1 for good 1 and p_2 for good 2. The quantities q of each good are evaluated at the same price regardless of their destination (to other firms as intermediate products or to final demand). This system can be written as follows:

$$\begin{array}{ccccc}
q_{11}p_1 & q_{12}p_1 & (q_{11}+q_{12})p_1 & f_1p_1 & g_1p_1 \\
q_{21}p_2 & q_{22}p_2 & (q_{21}+q_{22})p_2 & f_2p_2 & g_2p_2 \\
(q_{11}p_1+q_{21}p_2) & (q_{12}p_1+q_{22}p_2) & & & \\
v_1p_1 & v_2p_2 & & & \\
g_1p_1 & g_2p_2 & & & (g_1p_1+g_2p_2)
\end{array}$$

where the subscripts 1 and 2 denote the two goods, f final demand, v value added, and g gross output.

The employment matrix *N* can be written as:

$$N = \frac{1}{DET}\begin{bmatrix} \frac{N_1}{g_1p_1} & 0 \\ 0 & \frac{N_2}{g_2p_2} \end{bmatrix}\begin{bmatrix} 1-\frac{q_{22}p_2}{g_2p_2} & \frac{q_{12}p_1}{g_2p_2} \\ \frac{q_{21}p_2}{g_1p_1} & 1-\frac{q_{11}p_1}{g_1p_1} \end{bmatrix}\begin{bmatrix} f_1p_1 & 0 \\ 0 & f_2p_2 \end{bmatrix}$$

where *N* represent employment in the two industries and DET is the determinant of the coefficients matrix. DET is independent of the price level of the two goods:

$$DET = \left(1-\frac{q_{11}p_1}{g_1p_1}\right)\left(1-\frac{q_{22}p_2}{g_2p_2}\right)-\frac{q_{12}p_1}{g_1p_1}\frac{q_{21}p_2}{g_2p_2}$$

which simplifies to

$$DET = \left(1 - \frac{q_{11}}{g_1}\right)\left(1 - \frac{q_{22}}{g_2}\right) - \frac{q_{12}}{g_1}\frac{q_{21}}{g_2}$$

This is obviously not affected by the price level of either good.

Turning now to the rest of the employment matrix:

$$N = \frac{1}{DET}\begin{bmatrix} \frac{(p_1 f_1)n_1}{(g_1 p_1)}\left(1 - \frac{q_{22}p_2}{g_2 p_2}\right) & \frac{(q_{12}p_1)n_1(f_2 p_2)}{(g_1 p_1)(g_2 p_2)} \\ \frac{(q_{21}p_2)n_2(f_1 p_1)}{(g_1 p_1)(g_2 p_2)} & \frac{(f_2 p_2)n_2}{(g_2 p_2)}\left(1 - \frac{q_{11}p_1}{g_1 p_1}\right) \end{bmatrix}$$

It is clear that the employment generated by final demand in the different industries is not affected by variations in the price level of the goods produced.

This result hinges on only one hypothesis: the price of a good does not depend on its destination, whether it is used as intermediate good (purchased by a industry) or it is directed to final demand. This is already a key assumption for the technology of the input-output system.

APPENDIX 4: THE DECOMPOSITION OF THE EMPLOYMENT MATRIX

Input–output tables and the results from them change over time. In the same spirit as growth accounting, decomposing these variations allows us to identify and quantify the sources of change. The problem with decomposing within the input-output approach is that the decomposition is typically not unique. In our particular case, we are looking for a suitable decomposition of changes in the employment matrix.

The employment matrix can be written as:

$$N_k^t = n_k^t B_k^t F_k^t$$

where the subscript k denotes the country, the superscript t denotes the time period, N is the employment matrix, B is the Leontief inverse, n is a diagonal matrix, whose main diagonal contains sectoral productivity (ratio of employment to gross output), and F is a diagonal matrix whose main diagonal contains final demand (an entry for each industry). To lighten the notation we will drop the country subscript k, and index the time-periods as (19)70 and (19)90.

In the spirit of shift and share analysis, the difference in employment $\Delta N = N^{90} - N^{70}$ can be decomposed into the change in its three components: productivity, technical coefficients, and final demand. There are many possible decompositions; in general if there are z components there are z! possible (and equivalent) decompositions (in our case we have three components and thus 3!=6 possible decompositions).

One of the possible decompositions could be as shown in the following equation:

$$\Delta N = \Delta n B^{70} F^{90} + N^{70} \Delta B F^{90} + N^{90} B^{70} \Delta F$$

but an alternative and equivalent decomposition could read as:

$$\Delta n = \Delta n B^{90} F^{70} + N^{90} \Delta B F^{90} + N^{70} B^{90} \Delta F$$

Both decompositions are correct, but the weight, and hence importance, of the different components could differ significantly in the two formulations. Since all are formally correct, one would ideally compute all possible decompositions and then average across these. There are two special cases, as follows:

$$\Delta n = \Delta n B^{90} F^{90} + N^{70} \Delta B F^{90} + n^{70} B^{70} \Delta F \quad \text{[A]}$$

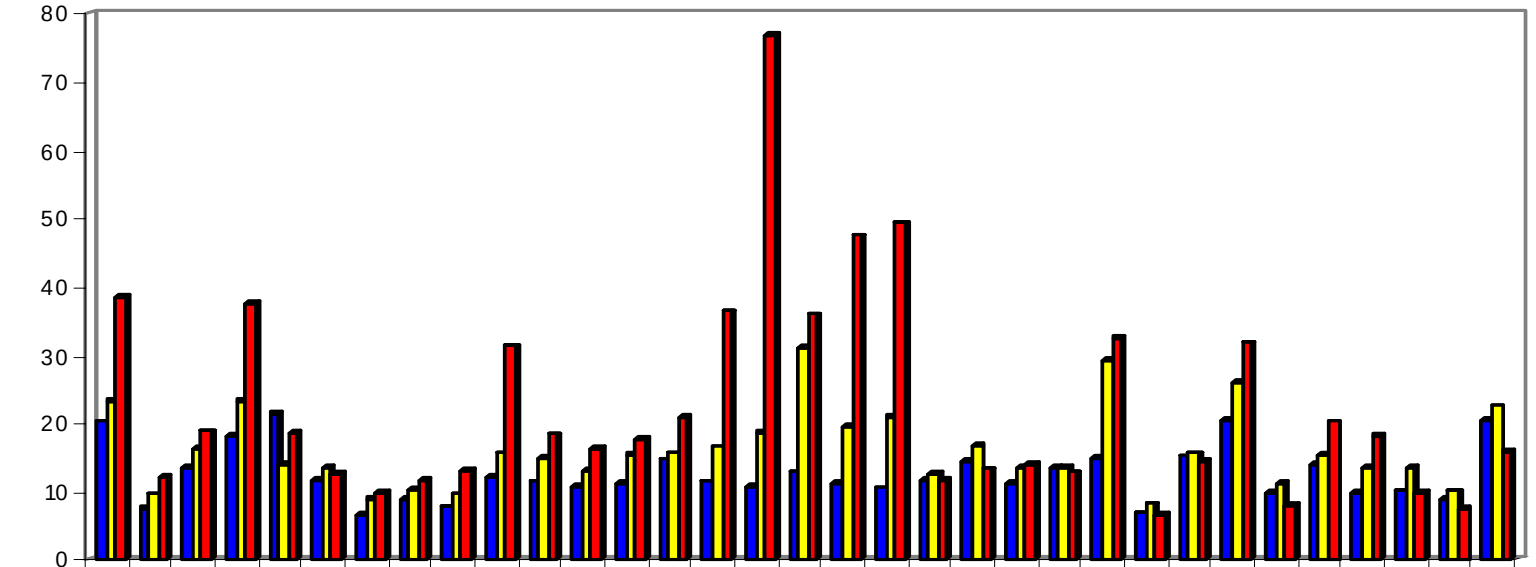
alternatively, the same difference in employment can be decomposed as follows:

$$\Delta n = \Delta n B^{70} F^{70} + n^{90} \Delta B F^{70} + n^{90} B^{90} \Delta F \quad \text{[B]}$$

These two decompositions are known as the "polar decompositions". The two decompositions are equivalent; and there is no theoretical reason to prefer one to the other. However, Dietzenbacher and Los (1998) show that the average effect of each component across all possible decompositions is virtually identical to the average between the two polar decompositions;

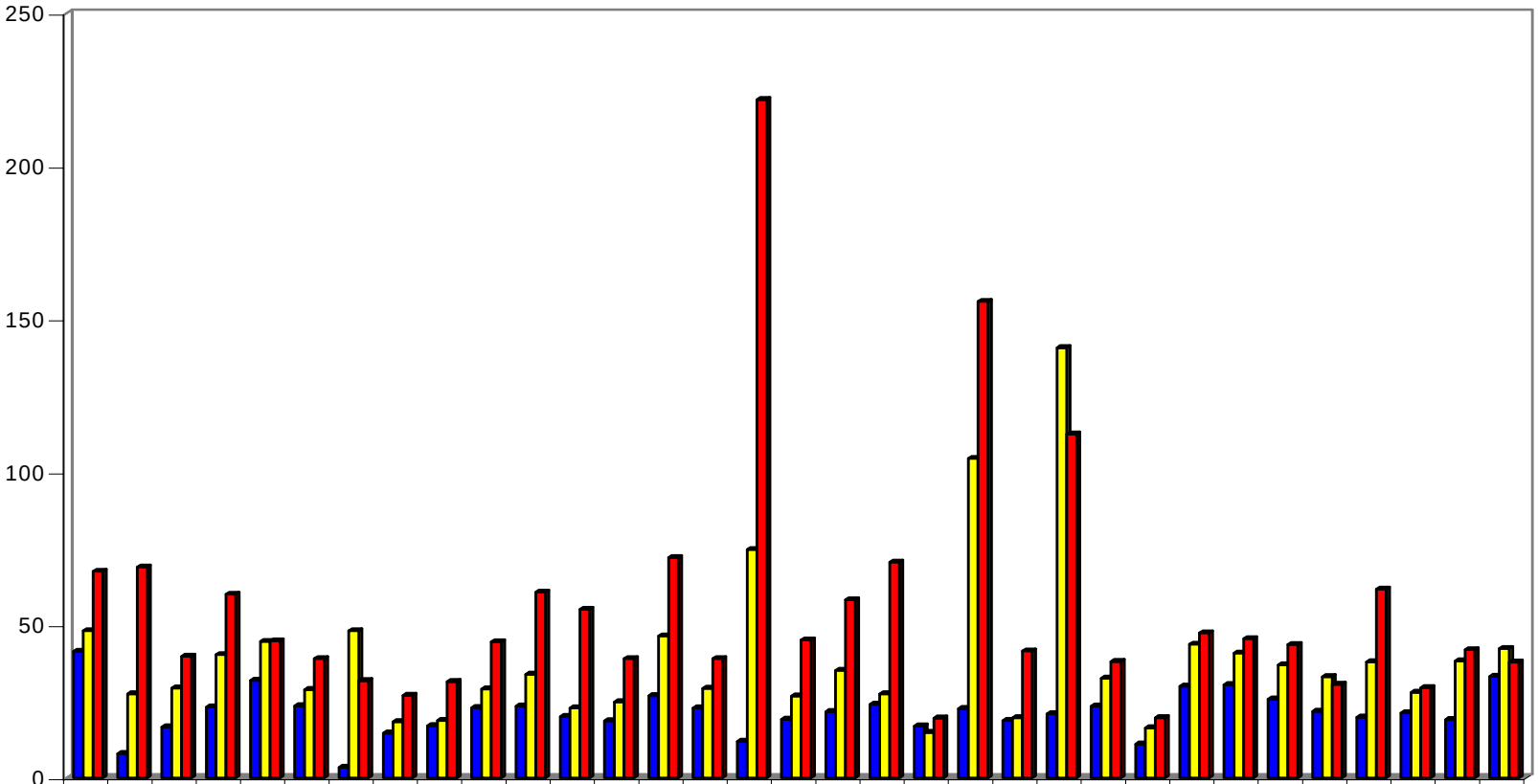
$$\Delta n = \frac{1}{2}(\Delta N B^{90} F^{90} + n^{70} \Delta B F^{90} + N^{70} B^{70} \Delta F) + \frac{1}{2}(\Delta n B^{70} F^{70} + N^{90} \Delta B F^{70} + N^{90} B^{90} \Delta F)$$

Figure 1: US: Jobs Created Economy Wide (in the VIS) by $1m. 1997



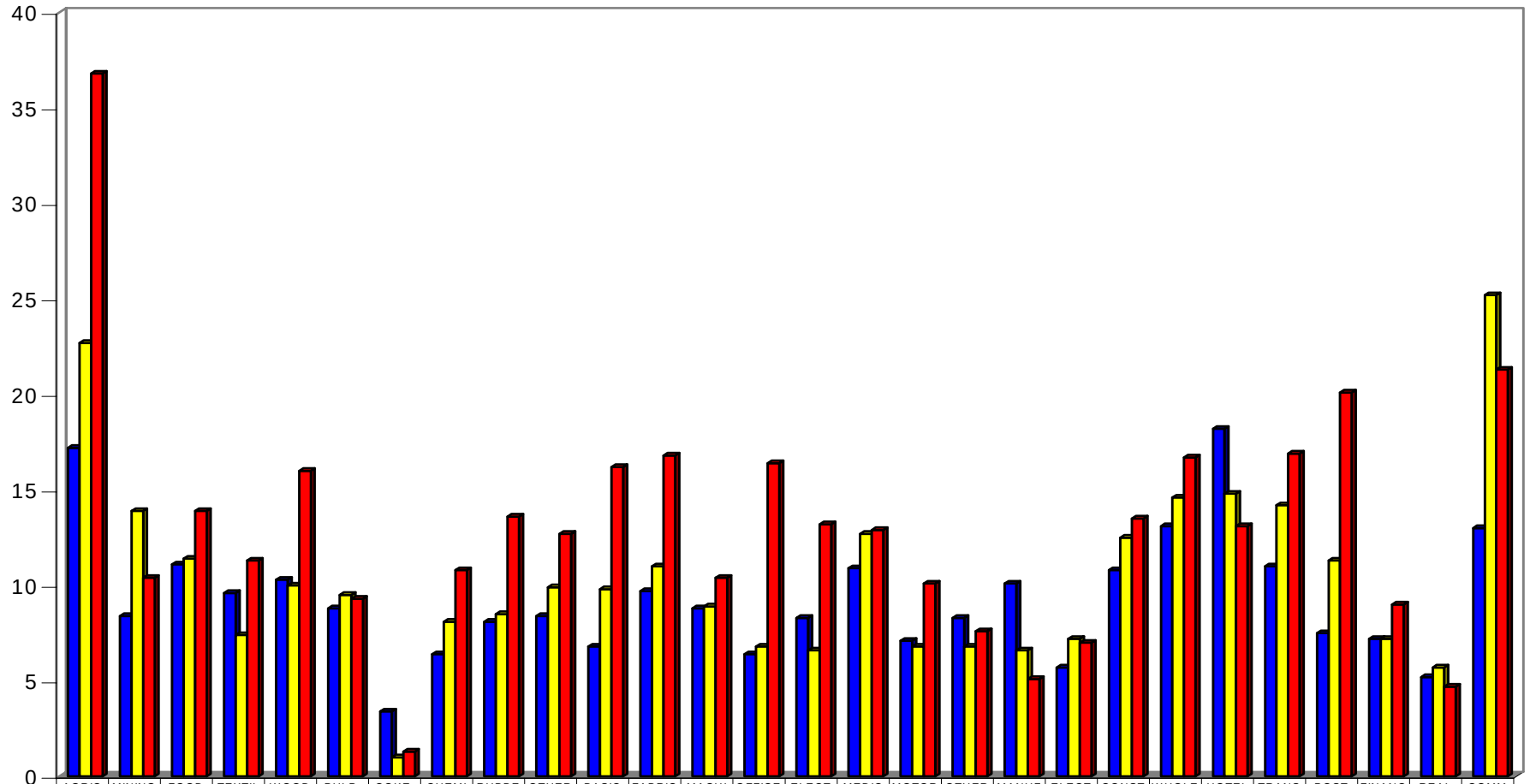
	AGRICULTU	MINING AND	FOOD PRO	TEXTILES,	WOOD AND	PULP, PAP	COKE, REF	CHEMICALS	PHARMACE	RUBBER AND	OTHER NON-	IRON & STE	NON-FERROU	FABRICATE	MACHINER	OFFICE, ACC	ELECTRICA	RADIO, TEL	MEDICAL,	MOTOR VEH	BUILDING	AIRCRAFT	RAILROAD	MANUFACT	ELECTRICI	CONSTRUCT	WHOLESAL	HOTELS AND	TRANSPORT	POST AND	FINANCE,	REAL EST	COMMUNI
1997	20	7.5	14	18	21	12	6.5	8.7	7.7	12	11	11	11	15	11	11	13	11	10	12	14	11	14	15	6.7	15	21	9.8	14	9.9	10	8.7	20
1990	23	9.5	16	23	14	14	8.8	10	9.5	16	15	13	15	16	16	18	31	20	21	13	17	14	14	29	8.1	16	26	11	15	13	13	10	22
1977	39	12	19	37	19	12	9.7	12	13	31	18	16	18	21	36	77	36	47	49	12	13	14	13	33	6.4	15	32	8	20	18	9.8	7.6	16

Figure 2: UK: Jobs Created Economy Wide (in the VIS) by £1m 1998



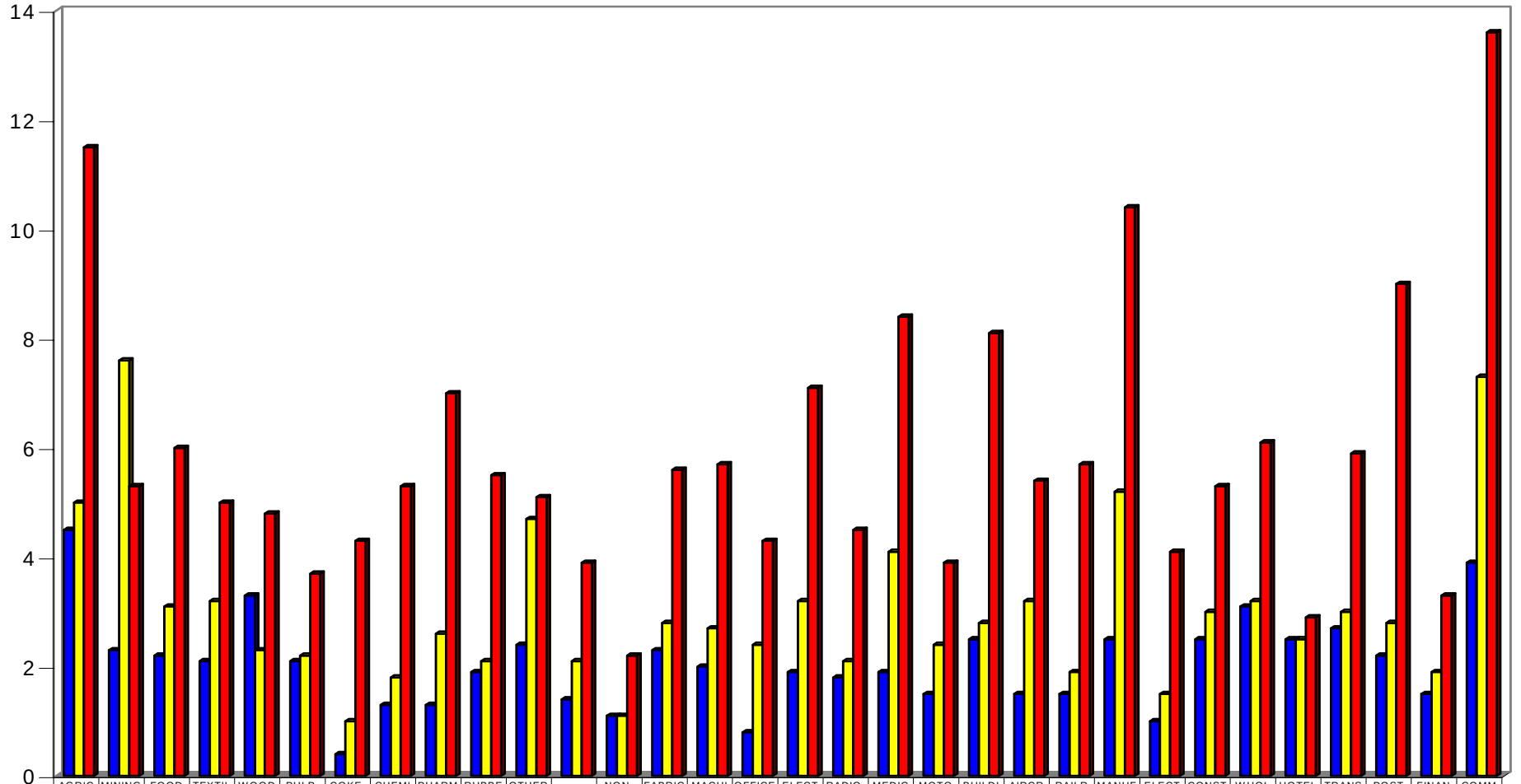
	AGRICULTURE,	MINING AND	FOOD PRODUCTS,	TEXTILES, TEXTI	WOOD AND	PULP, PAPER,	COKE, REFIN	CHEMICALS EXCL	PHARMACEUTICA	RUBBER AND	OTHER NON-	IRON & STEE	NON-FERROUS	FABRICATED	MACHINERY AND	OFFICE, ACCO	ELECTRICAL	RADIO, TELE	MEDICAL, PRECI	MOTOR VEHIC	BUILDING AND	AIRCRAFT AND	RAILROAD EQUI	MANUFACTURIN	ELECTRICITY,	CONSTRUCTION	WHOLESALE AND	HOTELS AND	TRANSPORT AND	POST AND TELE	FINANCE, INSU	REAL ESTATE	COMMUNITY,
1998	41,5	8	16,7	23,2	31,9	23,6	3,5	14,7	17,1	23	23,5	20,1	18,7	26,9	22,9	12	19,2	21,7	24,1	17	22,7	18,8	21	23,5	11,1	30	30,5	25,8	21,8	19,9	21,3	19,1	33,2
1990	48,2	27,5	29,4	40,4	44,7	28,9	48,2	18,4	18,8	29,1	33,9	22,9	24,9	46,5	29,3	74,7	26,8	35,2	27,5	14,9	104,5	19,7	140,7	32,6	16,4	43,8	40,9	37	33,1	38	28	38,3	42,4
1979	67,6	69	39,8	60,1	44,9	39,1	31,8	27	31,5	44,6	60,8	55,2	39,1	72,1	39,1	221,9	45,2	58,3	70,6	19,6	155,9	41,6	112,5	38,1	19,7	47,5	45,6	43,7	30,6	61,8	29,5	42	37,9

Figure 3: Germany: Jobs Created Economy Wide (in the VIS) by DM 1m. 1995



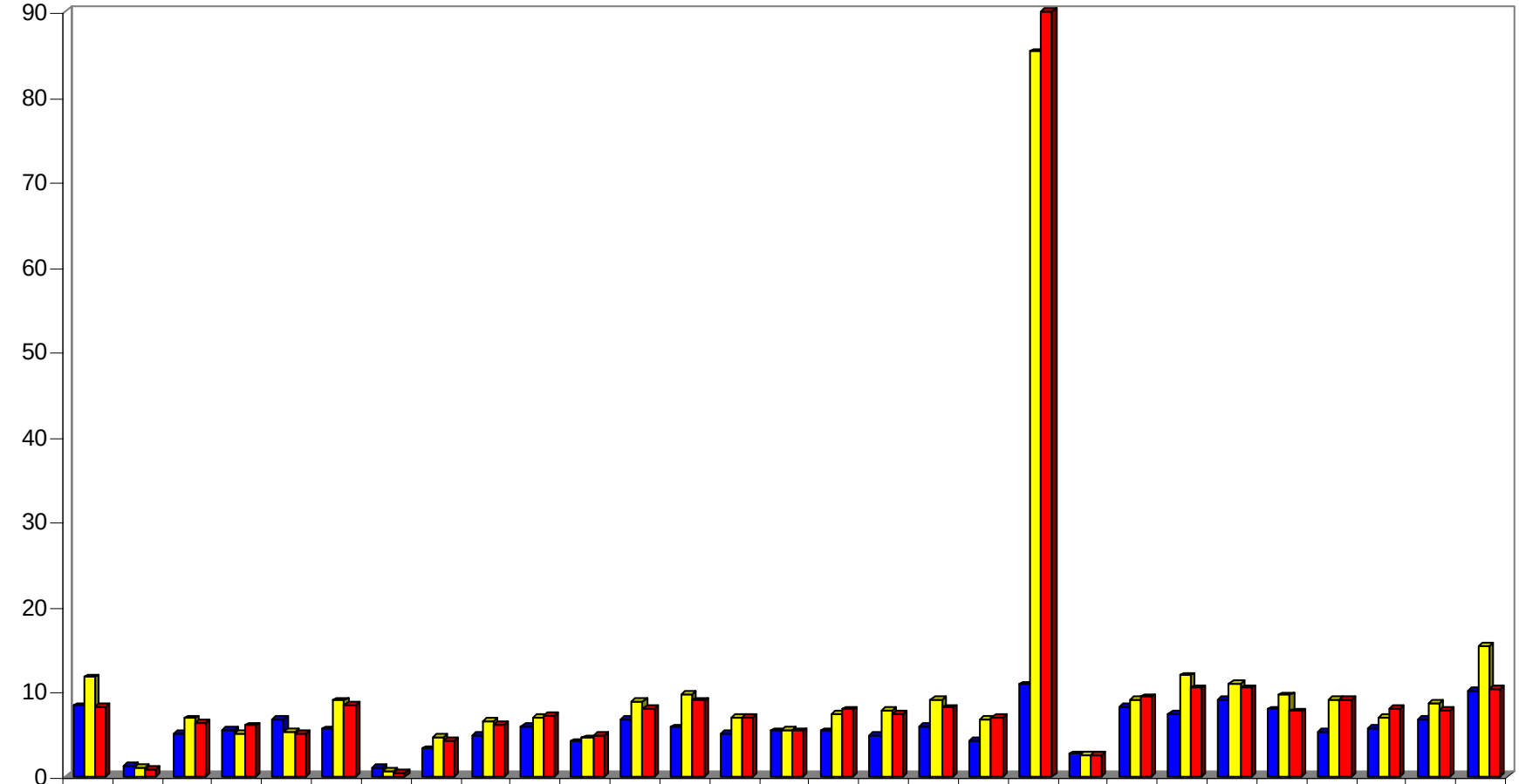
	AGRICULTURE,	MINING AND QUARR	FOOD PRODUCTS,	TEXTILES, TEXTIL	WOOD AND PRODU	PULP, PAPER, PAPER	COKE, REFINED	CHEMICALS EXCLU	RUBBER AND PLASTI	OTHER NON-METAL	BASIC METAL INDUST	FABRICATED METAL	MACHINERY AND	OFFICE, ACCOU	ELECTRICAL MACHI	MEDICAL, PRECIS	MOTOR VEHICLES,	OTHER TRANSPORT	MANUFACTURING	ELECTRICITY, GAS	CONSTRUCTION	WHOLESALE AND	HOTELS AND RESTA	TRANSPORT AND	POST AND TELEC	FINANCE, INSURA	REAL ESTATE	COMMUNITY, SOCIAL
1997	17,2	8,4	11,1	9,6	10,3	8,8	3,4	6,4	8,1	8,4	6,8	9,7	8,8	6,4	8,3	10,9	7,1	8,3	10,1	5,7	10,8	13,1	18,2	11	7,5	7,2	5,2	13
1990	22,7	13,9	11,4	7,4	10	9,5	1	8,1	8,5	9,9	9,8	11	8,9	6,8	6,6	12,7	6,8	6,8	6,6	7,2	12,5	14,6	14,8	14,2	11,3	7,2	5,7	25,2
1977	36,8	10,4	13,9	11,3	16	9,3	1,3	10,8	13,6	12,7	16,2	16,8	10,4	16,4	13,2	12,9	10,1	7,6	5,1	7	13,5	16,7	13,1	16,9	20,1	9	4,7	21,3

Figure 4: France: Jobs Created Economy Wide (in the VIS) by FF 1m. 1995



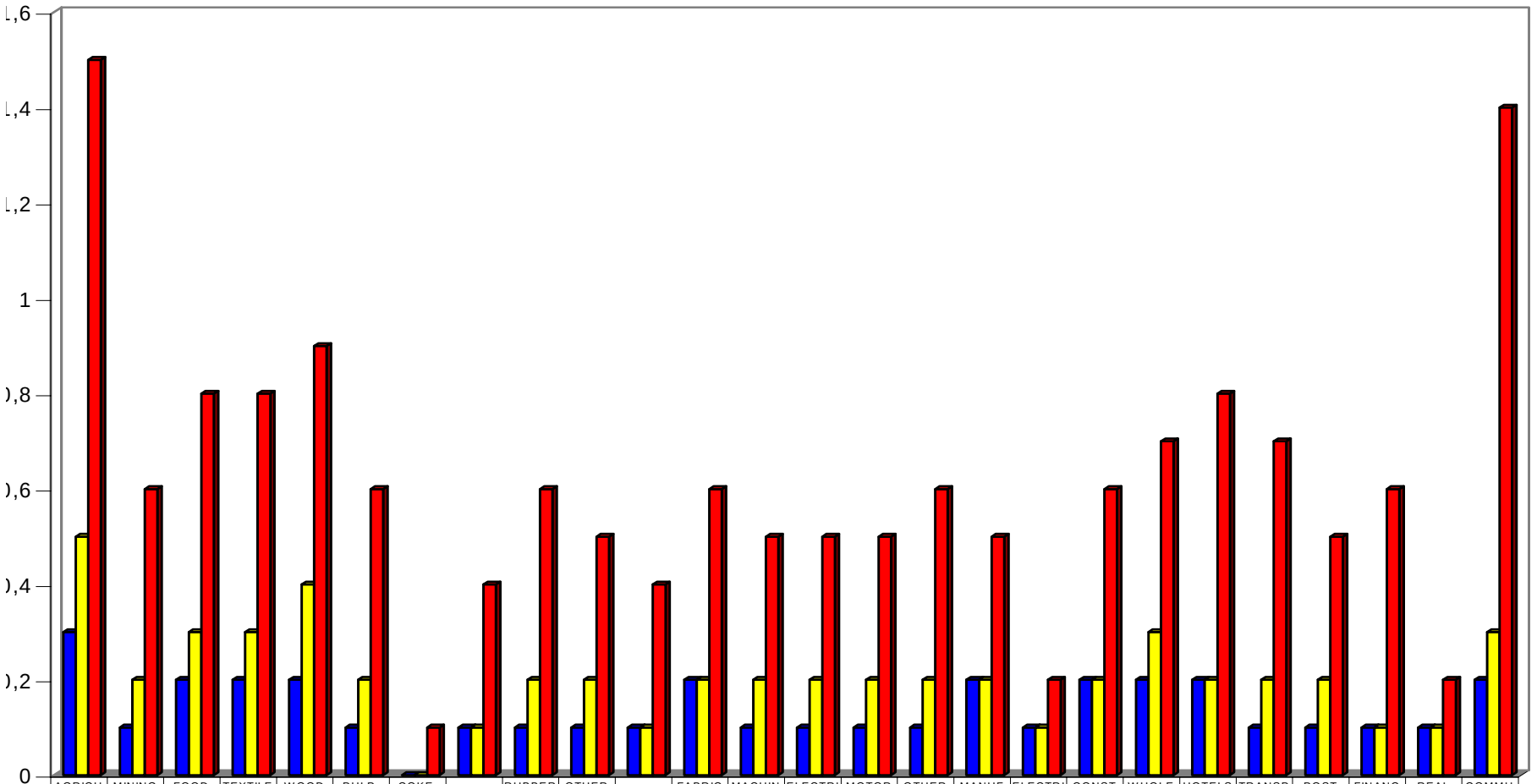
	AGRICULTURE,	MINING AND QUARR	FOOD PRODUCTS,	TEXTILES, TEXTIL	WOOD AND PRODU	PULP, PAPER, PAPER	COKE, REFINED	CHEMICALS EXCLU	PHARMACEUTICALS	RUBBER AND PLASTI	OTHER NON-METAL	IRON & STEEL	NON-FERROUS	FABRICATED METAL	MACHINERY AND	OFFICE, ACCOU	ELECTRICAL MACHI	RADIO, TELEVISION	MEDICAL, PRECI	MOTOR VEHICL	BUILDING AND	AIRCRAFT AND	RAILROAD EQUIP	MANUFACTURING	ELECTRICITY, GAS	CONSTRUCTION	WHOLESALE AND	HOTELS AND RESTA	TRANSPORT AND	POST AND TELEC	FINANCE, INSUR	COMMUNITY, SOCIAL
1997	4,5	2,3	2,2	2,1	3,3	2,1	0,4	1,3	1,3	1,9	2,4	1,4	1,1	2,3	2	0,8	1,9	1,8	1,9	1,5	2,5	1,5	1,5	2,5	1	2,5	3,1	2,5	2,7	2,2	1,5	3,9
1990	5	7,6	3,1	3,2	2,3	2,2	1	1,8	2,6	2,1	4,7	2,1	1,1	2,8	2,7	2,4	3,2	2,1	4,1	2,4	2,8	3,2	1,9	5,2	1,5	3	3,2	2,5	3	2,8	1,9	7,3
1977	11,5	5,3	6	5	4,8	3,7	4,3	5,3	7	5,5	5,1	3,9	2,2	5,6	5,7	4,3	7,1	4,5	8,4	3,9	8,1	5,4	5,7	10,4	4,1	5,3	6,1	2,9	5,9	9	3,3	13,6

Figure 5: Netherlands: Jobs Created Economy Wide (in the VIS) by F1. Lm. 1997



	AGRICULTURE,	MINING AND	FOOD PRODUCTS	TEXTILES, TEXTI	WOOD AND	PULP, PAPER,	COKE, REFI	CHEMICALS	RUBBER AND	OTHER NON-	IRON & STEE	FABRICATED	MACHINERY	OFFICE, ACC	RADIO, TELE	MEDICAL, PREC	MOTOR VEHI	BUILDING AND	OTHER TRAN	MANUFACTURI	ELECTRICITY,	CONSTRUCTION	WHOLESALE	HOTELS AND	TRANSPORT	POST AND TELE	FINANCE, INSU	REAL ESTATE	COMMUNITY,
1997	8.3	1.2	5	5.5	6.7	5.6	1	3.3	4.9	5.9	4.1	6.7	5.8	5	5.4	5.4	4.9	5.9	4.2	10.8	2.6	8.2	7.3	9	7.9	5.2	5.7	6.7	10.1
1986	11.7	1.1	6.8	5.1	5.3	8.9	0.6	4.6	6.5	6.9	4.5	8.8	9.7	6.9	5.5	7.4	7.8	9	6.7	85.3	2.5	9	11.9	10.9	9.6	9.1	6.9	8.6	15.3
1977	8.2	0.8	6.3	6	5.1	8.4	0.4	4.2	6.1	7.1	4.8	8	8.9	6.9	5.4	7.9	7.4	8.1	7	90	2.5	9.4	10.4	10.4	7.7	9	8	7.8	10.3

Figure 6: Spain: Jobs Created Economy Wide (in the VIS) by Ptas. 1m. 1995



	AGRICULTURE, HUNTIN	MINING AND QUARR	FOOD PRODUCTS,	TEXTILES, TEXTILE	WOOD AND PRODU	PULP, PAPER, PAPER	COKE, REFINED	CHEMICALS	RUBBER AND PLASTIC	OTHER NON-METALLI	BASIC METALS	FABRICATED METAL	MACHINERY AND	ELECTRIC AND OPTICA	MOTOR VEHICLES,	OTHER TRANSPORT	MANUFACTURING NEC;	ELECTRICITY, GAS	CONSTRUCTION	WHOLESALE AND	HOTELS AND RESTAU	TRANSPORT AND	POST AND TELECO	FINANCE, INSURA	REAL ESTATE, BUSINE	COMMUNITY, SOCIAL
1995	0,3	0,1	0,2	0,2	0,2	0,1	0	0,1	0,1	0,1	0,1	0,2	0,1	0,1	0,1	0,1	0,2	0,1	0,2	0,2	0,2	0,1	0,1	0,1	0,1	0,2
1990	0,5	0,2	0,3	0,3	0,4	0,2	0	0,1	0,2	0,2	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,1	0,2	0,3	0,2	0,2	0,2	0,1	0,1	0,3
1980	1,5	0,6	0,8	0,8	0,9	0,6	0,1	0,4	0,6	0,5	0,4	0,6	0,5	0,5	0,5	0,6	0,5	0,2	0,6	0,7	0,8	0,7	0,5	0,6	0,2	1,4

Figure 7: Concentration of Employment Deriving from Changes in Final Demand

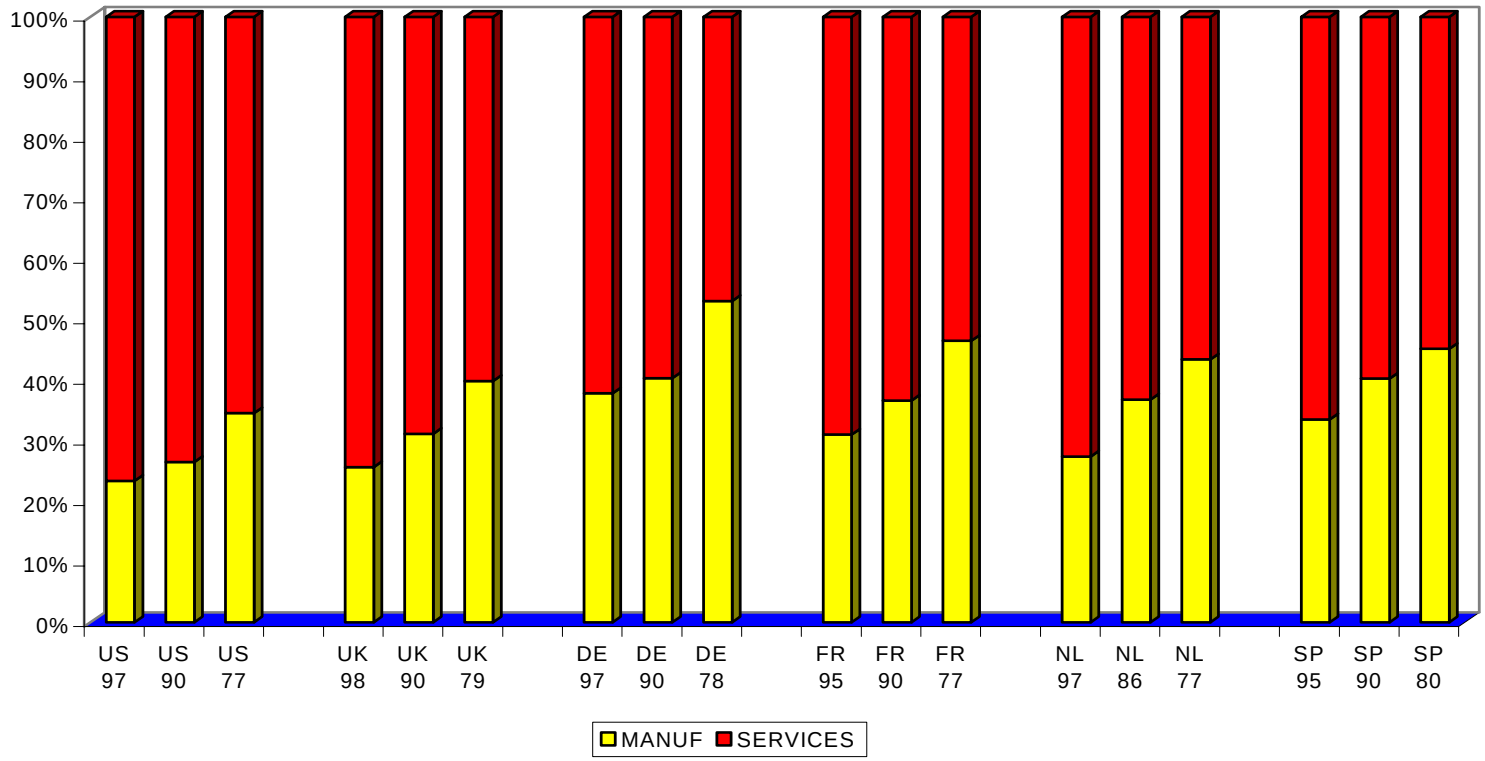


Figure 8: Employment Effect of Alternative (Country) Consumption Mixes
(% of US 1997 employment due to consumption)

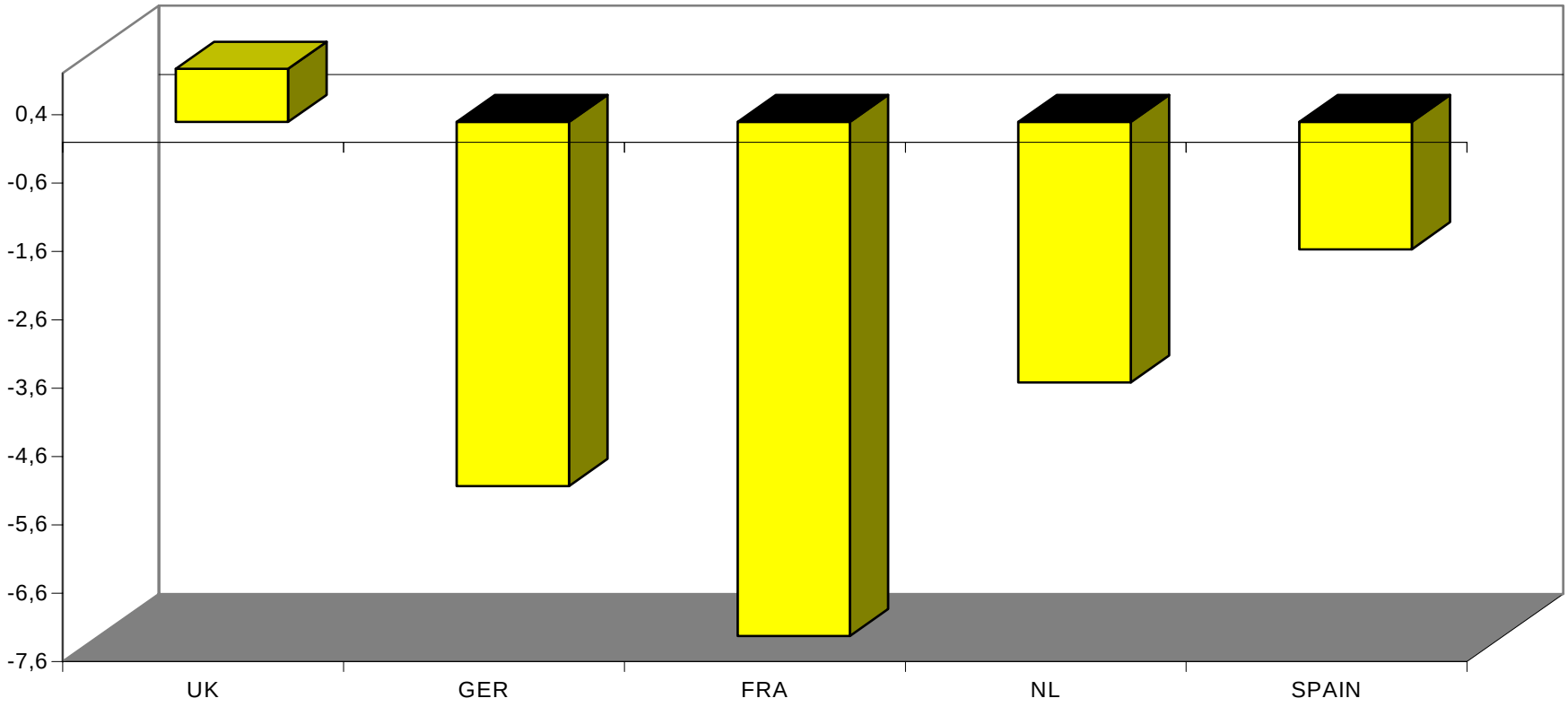


Figure 9: Employment Effect of US Consumption Mix
(% of country's employment from own consumption mix)

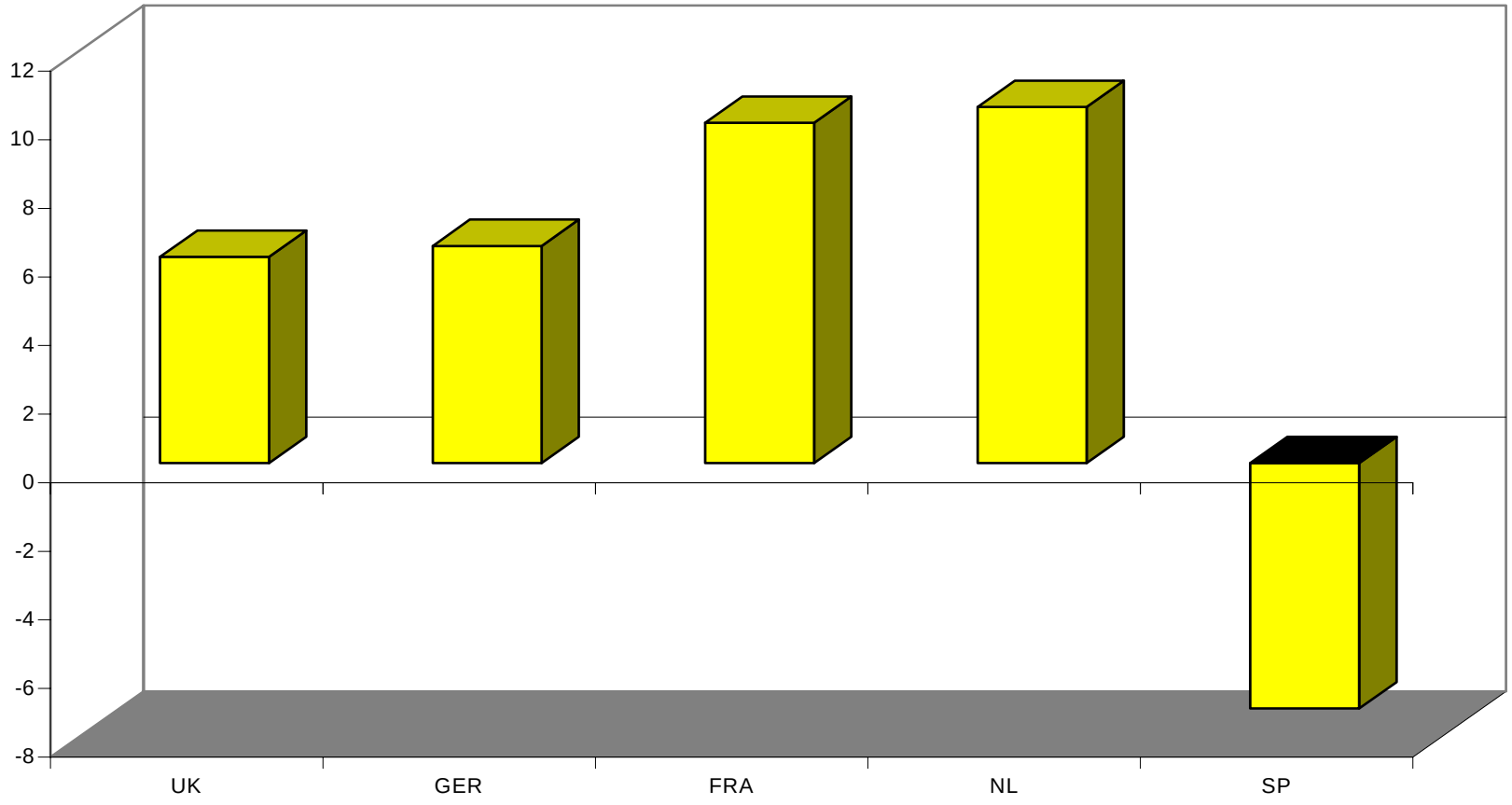
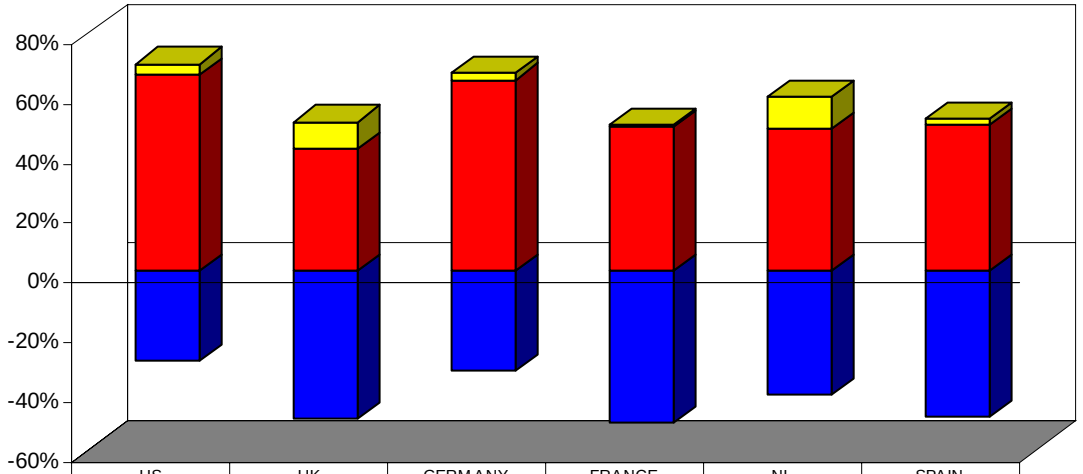


Figure 10a: Decomposition of Employment Change (FTEs) in the VIS due to Final Demand among Demand, Labour Productivity and Structural Change, Late 1990s - Late 1970s, All Countries

PRD: Productivity Growth Effect (Dark Shade, negative), DEM: Demand Growth Effect (Dark Shade, positive), INT_IND_INTD : Effects of Changes in the Inter-Industry Linkages (pale shade).

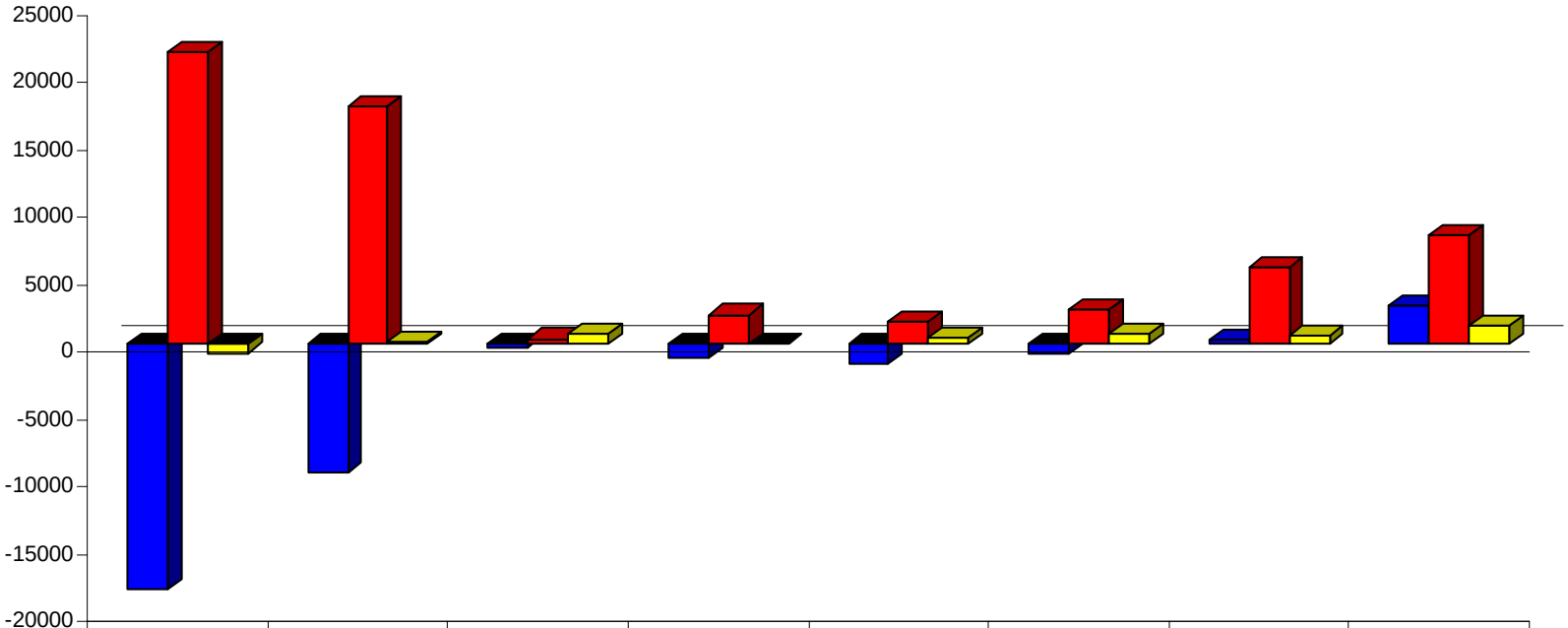
Figure 10b: Decomposition of Employment Change (%) in the VIS among Final Demand, Labour Productivity and Structural Change, Late 1990s - Late 1970s, All Countries



	US	UK	GERMANY	FRANCE	NL	SPAIN
INT_IND_INT	3636,4175	3095,4348	621,0599	284,5047	712,0563	1168,8521
DEM	60053,6284	13553,8971	16100,2261	21597,2228	3112,4387	26427,1848
PRD	-27998,2388	-16646,0834	-8402,5927	-22788,0325	-2750,8559	-26600,1239

PRD: Productivity Growth Effect (Dark Shade, negative), DEM: Demand Growth Effect (Dark Shade, positive), INT_IND_INTD : Effects of Changes in the Inter-Industry Linkages (pale shade).

Figure 11: Decomposition of Employment Change in the VIS among Final Demand, Labour Productivity and Structural Change, US 1997 - 1977

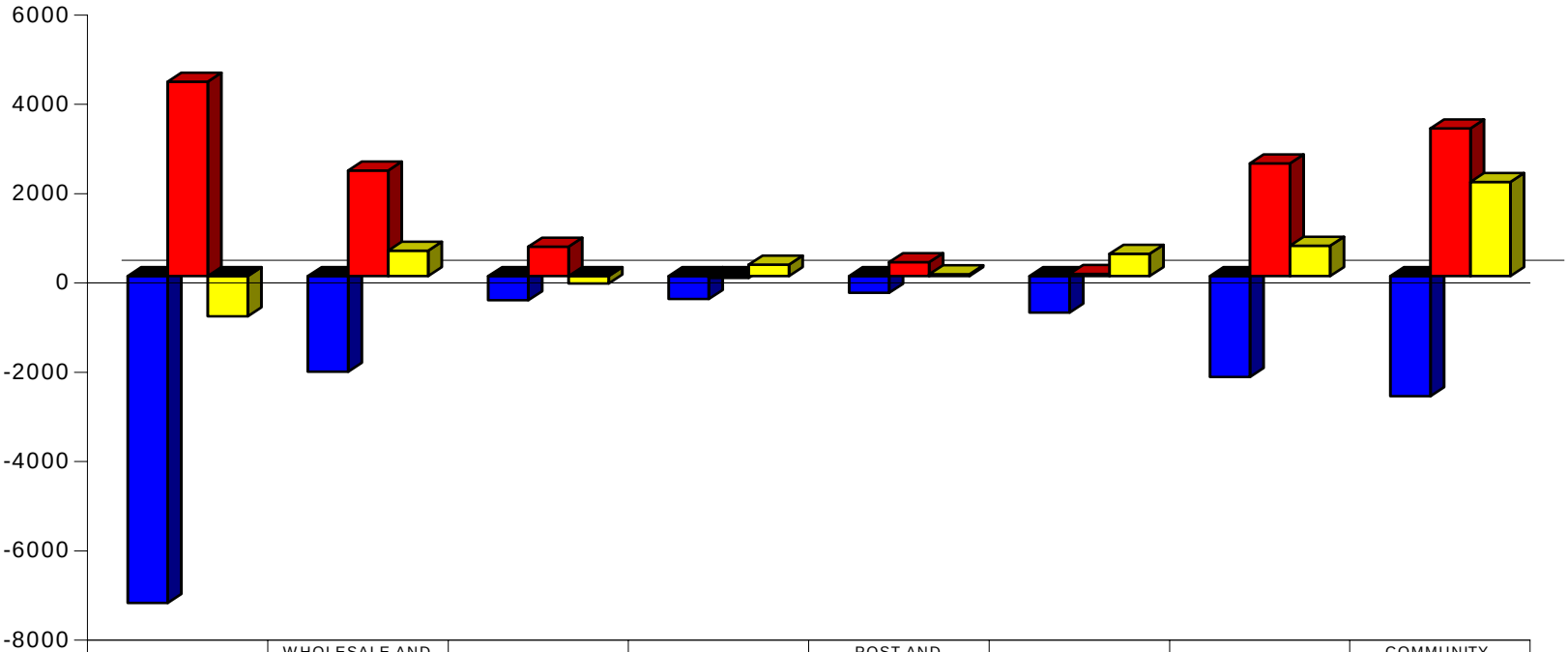


	TOTAL MANUFACTURING	WHOLESALE AND RETAIL TRADE; REPAIRS	HOTELS AND RESTAURANTS	TRANSPORT AND STORAGE	POST AND TELECOMMUNICATIONS	FINANCE, INSURANCE	REAL ESTATE AND BUSINESS SERVICES	COMMUNITY, SOCIAL AND PERSONAL SERVICES
PROD	-18234,0711	-9560,4721	-197,2741	-988,2594	-1437,6619	-721,2134	304,2215	2836,4916
DEM	21727,8949	17722,8171	396,5494	2205,4474	1626,233	2560,508	5691,4284	8122,75
INT_IND_INTD	-640,592	191,8618	752,3395	-28,2978	421,4835	843,9481	676,6315	1419,0431

Total Manufacturing comprises: Agriculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC3), Public Utilities (ISIC 4), and Construction (ISIC 5).

PRD: Productivity Growth Effect (Dark Shade, negative), DEM: Demand Growth Effect (Dark Shade, positive), INT_IND_INTD : Effects of Changes in the Inter-Industry Linkages (pale shade).

Figure 12: Decomposition of Employment Change in the VIS among Final Demand, Labour Productivity and Structural Change, UK 1998 - 1979

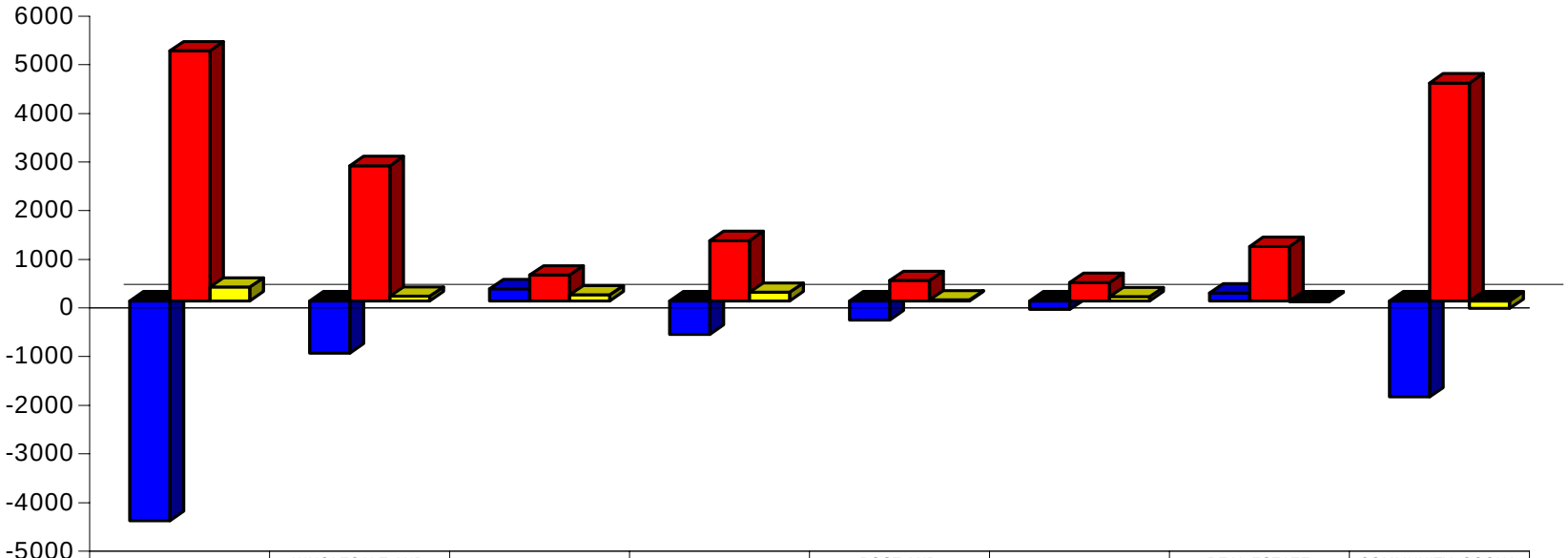


	TOTAL MANUFACTURING	WHOLESALE AND RETAIL TRADE; REPAIRS	HOTELS AND RESTAURANTS	TRANSPORT AND STORAGE	POST AND TELECOMMUNICATIONS	FINANCE, INSURANCE	REAL ESTATE AND BukINESS SERVICES	COMMUNITY, SOCIAL AND PERSONAL
PROD	-7320,2077	-2137,548	-539,2278	-511,3558	-370,7321	-817,8075	-2260,4581	-2688,7464
DEM	4357,5342	2368,7545	663,3322	-37,3188	314,1583	50,3745	2526,6388	3310,4236
INT_IND_INTD	-899,3433	571,3688	-168,0653	258,6122	41,1431	502,027	678,9023	2110,7899

Total Manufacturing comprises: Agriculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC3), Public Utilities (ISIC 4), and Construction (ISIC 5).

PRD: Productivity Growth Effect (Dark Shade, negative), DEM: Demand Growth Effect (Dark Shade, positive), INT_IND_INTD : Effects of Changes in the Inter-Industry Linkages (pale shade).

Figure 13: Decomposition of Employment Change in the VIS among Final Demand, Labour Productivity and Structural Change, Germany 1995 - 1978

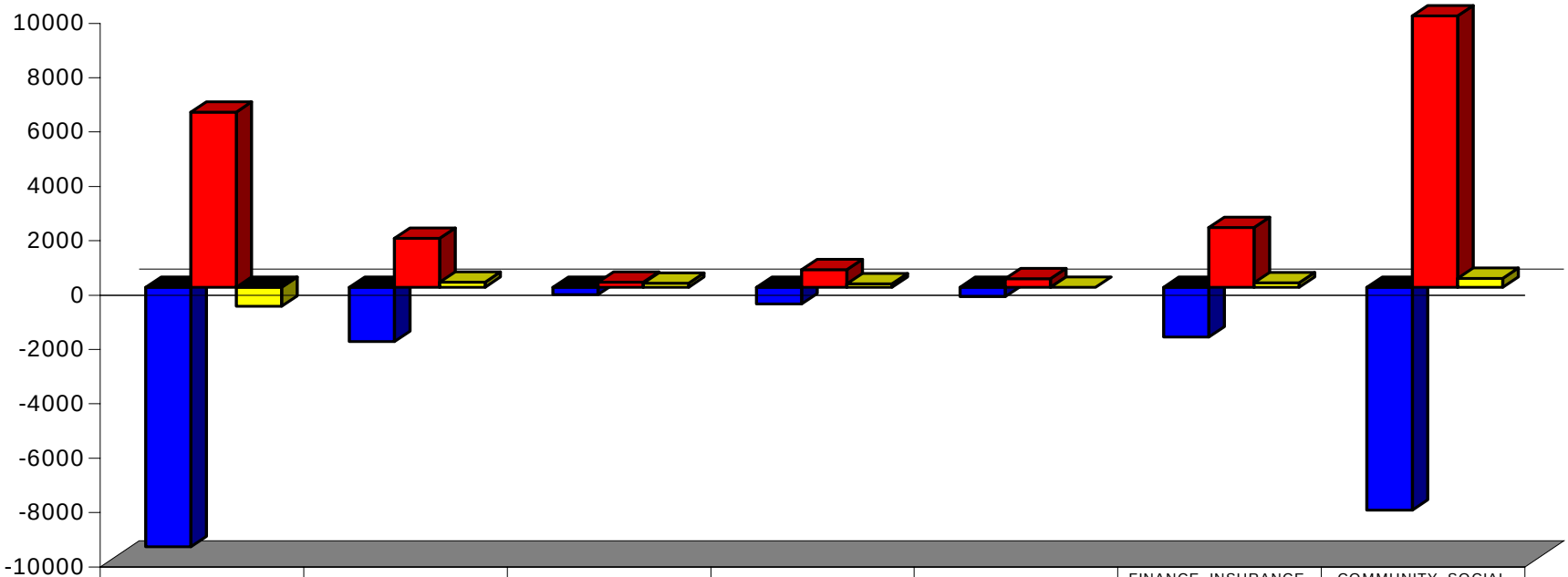


	TOTAL MANUFACTURING	WHOLESALE AND RETAIL TRADE; REPAIRS	HOTELS AND RESTAURANTS	TRANSPORT AND STORAGE	POST AND TELECOMMUNICATIONS	FINANCE, INSURANCE	REAL ESTATE ACTIVITIES, AND BUSINESS SERVICES	COMMUNITY, SOCIAL AND PERSONAL SERVICES
PROD	-4513,6904	-1073,1089	248,9358	-686,1666	-391,9714	-176,5652	162,8698	-1972,8959
DEM	5141,4139	2781,8397	533,7212	1241,9082	421,4277	378,3297	1120,1564	4481,4292
INT_IND_INTD	286,1726	93,92	125,5148	179,7421	19,2261	88,142	-18,3056	-153,3524

Total Manufacturing comprises: Agriculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC3), Public Utilities (ISIC 4), and Construction (ISIC 5).

PRD: Productivity Growth Effect (Dark Shade, negative), DEM: Demand Growth Effect (Dark Shade, positive), INT_IND_INTD : Effects of Changes in the Inter-Industry Linkages (pale shade).

Figure 14: Decomposition of Employment Change in the VIS among Final Demand, Labour Productivity and Structural Change, France 1995 - 1977

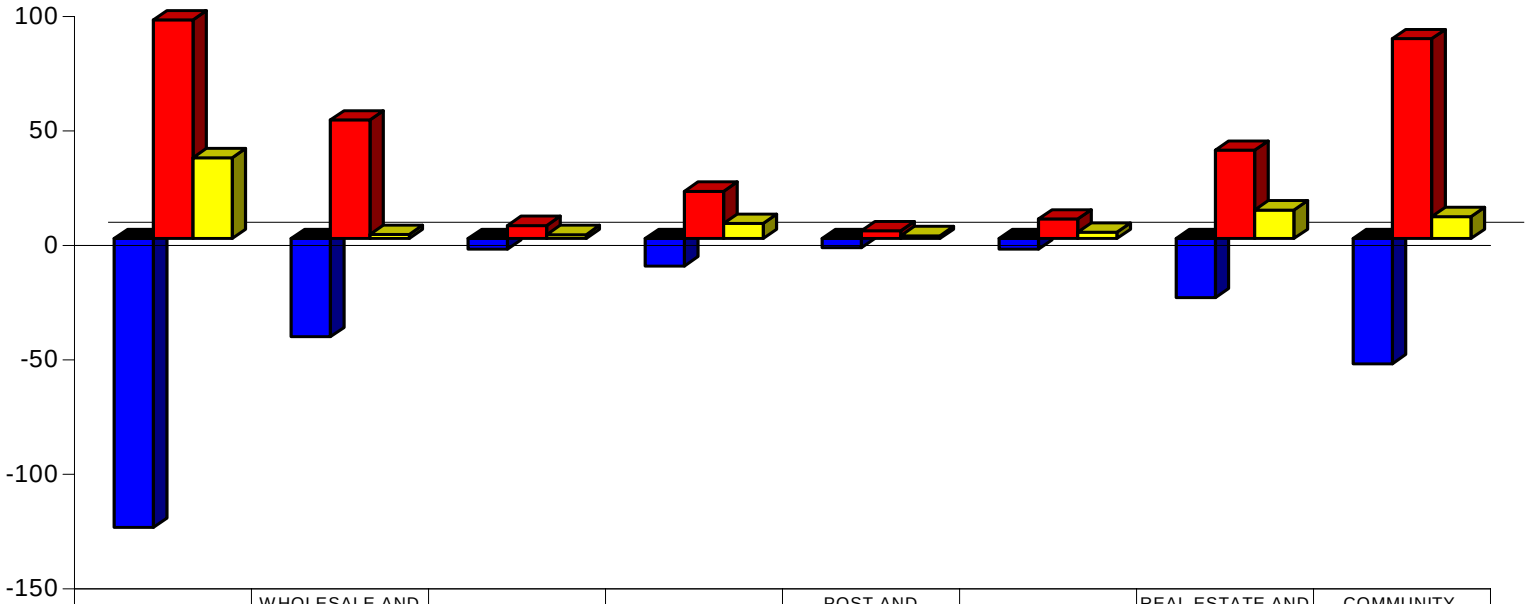


	TOTAL MANUFACTURING	WHOLESALE AND RETAIL TRADE; REPAIRS	HOTELS AND RESTAURANTS	TRANSPORT AND STORAGE	POST AND TELECOMMUNICATIONS	FINANCE, INSURANCE, REAL ESTATE AND BUSINESS SERVICES	COMMUNITY, SOCIAL AND PERSONAL SERVICES
PROD	-9547,6523	-1993,621	-263,7675	-613,8798	-346,3402	-1830,2584	-8192,5134
DEM	6438,5727	1802,3438	193,9394	647,1743	322,8258	2201,189	9991,1779
INT_IND_INTD	-693,9255	192,9554	149,3898	131,6867	6,1939	168,2527	329,9514

Total Manufacturing comprises: Agriculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC3), Public Utilities (ISIC 4), and Construction (ISIC 5).

PRD: Productivity Growth Effect (Dark Shade, negative), DEM: Demand Growth Effect (Dark Shade, positive), INT_IND_INTD : Effects of Changes in the Inter-Industry Linkages (pale shade).

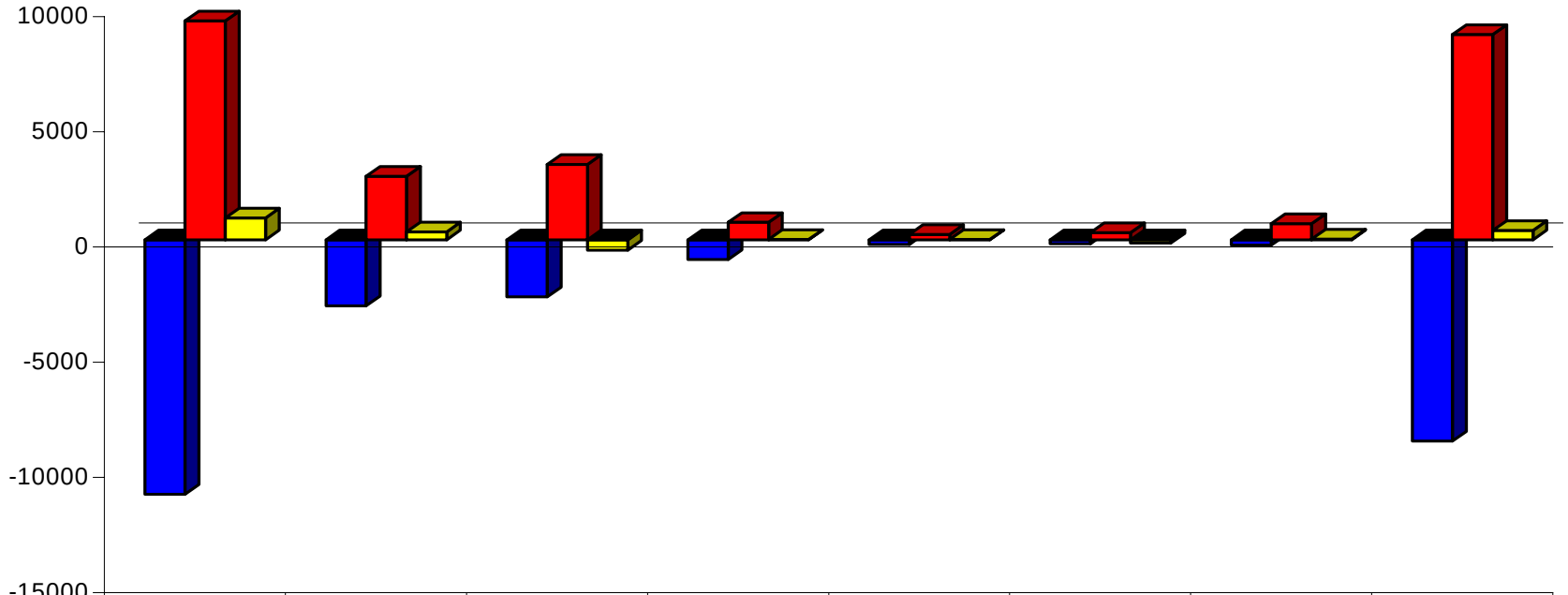
Figure 15: Decomposition of Employment Change in the VIS among Final Demand, Labour Productivity and Structural Change, The Netherlands 1997 - 1986



	TOTAL MANUFACTURING	WHOLESALE AND RETAIL TRADE; REPAIRS	HOTELS AND RESTAURANTS	TRANSPORT AND STORAGE	POST AND TELECOMMUNICATIONS	FINANCE, INSURANCE	REAL ESTATE AND BUSINESS SERVICES	COMMUNITY, SOCIAL, AND PERSONAL
PROD	-126,2132	-42,91795	-4,62143	-11,99892	-4,03806	-4,68199	-25,88771	-54,72636
DEM	95,46885	51,76476	5,67431	20,63515	3,32947	8,55422	38,59506	87,22204
INT_IND_INTD	35,25441	1,81165	1,66813	6,55775	1,16608	2,70883	12,4488	9,59001

Total Manufacturing comprises: Agriculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC3), Public Utilities (ISIC 4), and Construction (ISIC 5).
PRD: Productivity Growth Effect (Dark Shade, negative), DEM: Demand Growth Effect (Dark Shade, positive), INT_IND_INTD : Effects of Changes in the Inter-Industry Linkages (pale shade).

Figure 16: Decomposition of Employment Change in the VIS among Final Demand, Labour Productivity and Structural Change, Spain 1995 - 1980

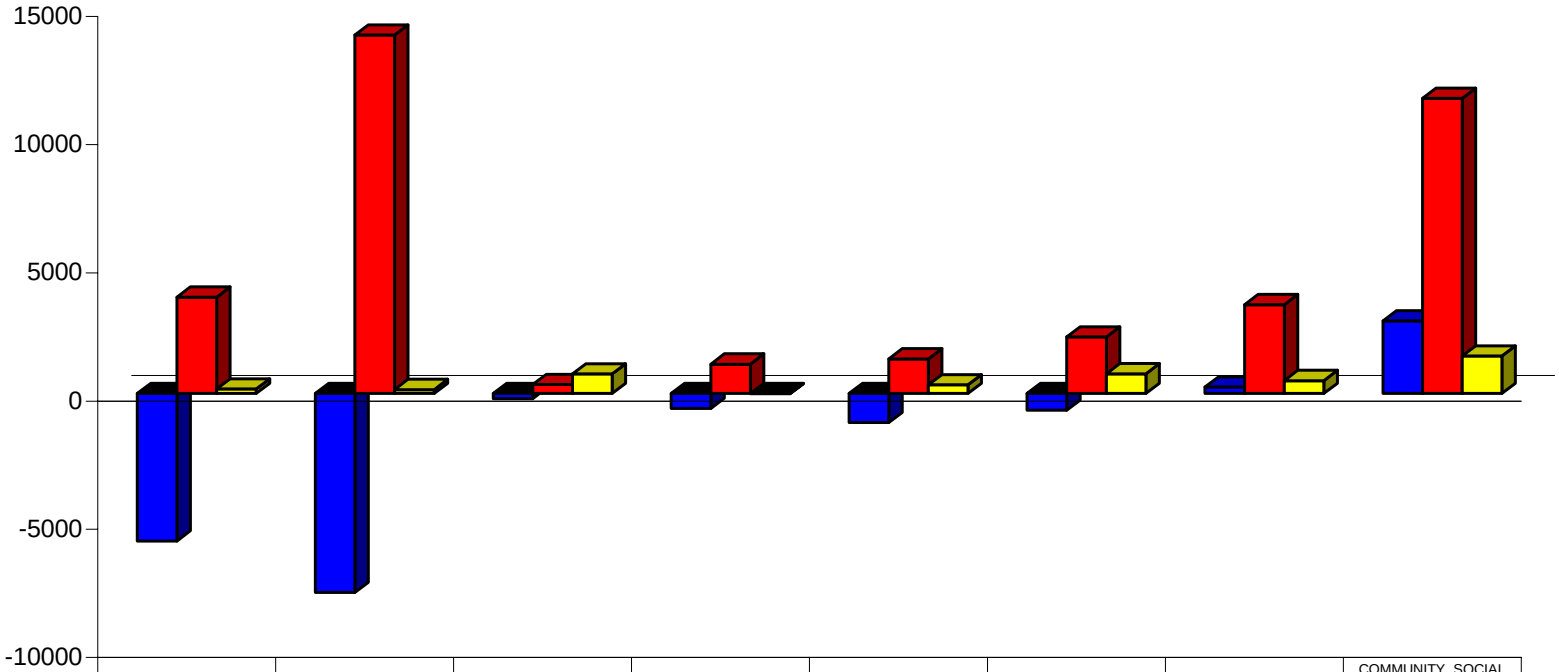


	TOTAL MANUFACTURING	WHOLESALE AND RETAIL TRADE; REPAIRS	HOTELS AND RESTAURANTS	TRANSPORT AND STORAGE	POST AND TELECOMMUNICATIONS	FINANCE, INSURANCE	REAL ESTATE, BUSINESS SERVICES	COMMUNITY, SOCIAL AND PERSONAL SERVICES
PROD	-11042,4454	-2863,3284	-2474,6852	-862,1634	-206,1967	-177,8746	-236,4902	-8736,9401
DEM	9498,3826	2757,5652	3274,152	755,1624	232,9105	308,411	697,5173	8903,0836
INT_IND_INTD	945,8143	336,4832	-445,5448	18,6006	19,1298	-134,714	25,7027	403,3802

Total Manufacturing comprises: Agriculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC3), Public Utilities (ISIC 4), and Construction (ISIC 5).

PRD: Productivity Growth Effect (Dark Shade, negative), DEM: Demand Growth Effect (Dark Shade, positive), INT_IND_INTD : Effects of Changes in the Inter-Industry Linkages (pale shade).

Figure 17: Decomposition of Employment Change in the VIS due to Consumption among Demand, Labour Productivity and Structural Change, US 1997 - 1977

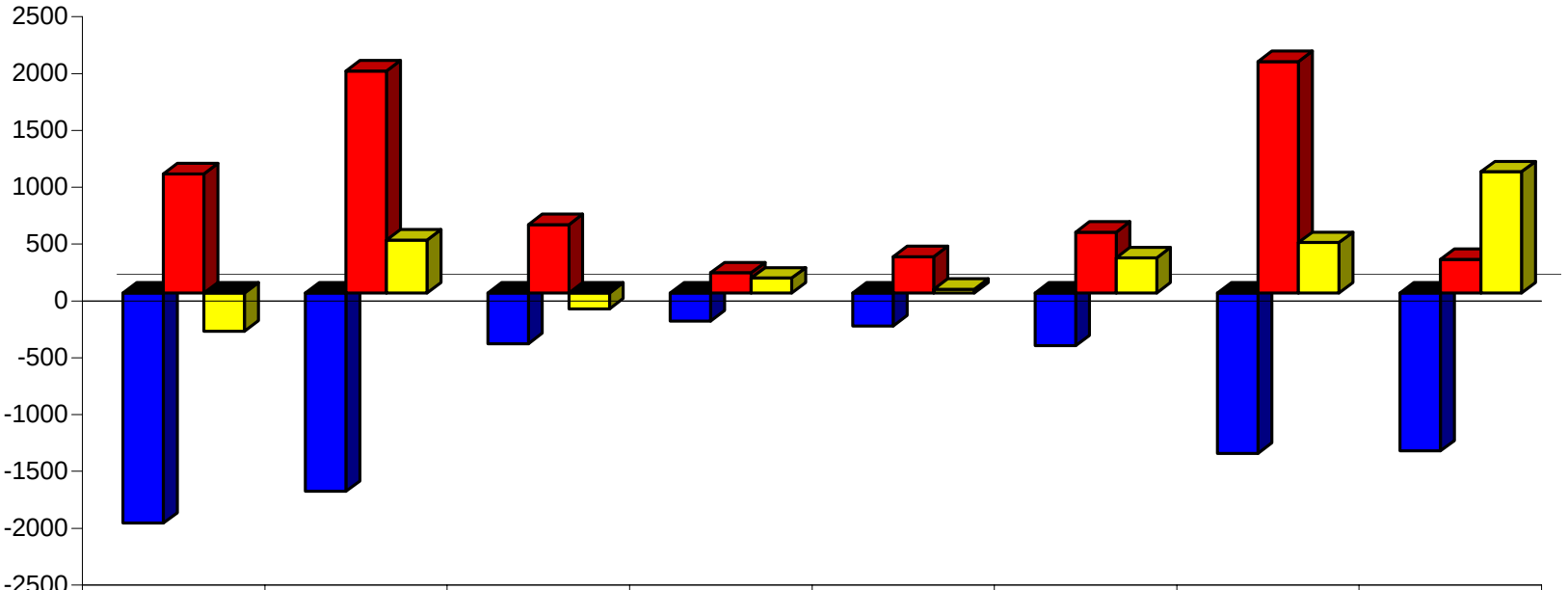


	TOTAL MANUFACTURING	WHOLESALE AND RETAIL TRADE; REPAIRS	HOTELS AND RESTAURANTS	TRANSPORT AND STORAGE	POST AND TELECOMMUNICATIONS	FINANCE, INSURANCE	REAL ESTATE AND BUSINESS SERVICES	COMMUNITY, SOCIAL AND PERSONAL SERVICES
PROD	-5757,0221	-7762,121	-196,7122	-581,1857	-1139,2818	-654,6372	250,7685	2830,3703
DEM	3757,7444	13976,9023	352,3712	1145,3835	1346,3912	2200,3631	3464,6241	11512,4576
INT_IND_INTD	174,9856	151,9181	754,0122	-18,5075	335,6699	766,3657	503,5227	1459,8042

Total Manufacturing comprises: Agiculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC 3), Public Utilities (ISIC 4), Construction (ISIC 5)

PRD: Productivity Growth Effect (Darj Shade, negative), DEN: Demand Growth Effect (Dark Shade, positive), INT_IND: Industry Linkages (pale shade).

Figure 18: Decomposition of Employment Change in the VIS due to Consumption among Demand, Labour Productivity and Structural Change, UK 1998 - 1979

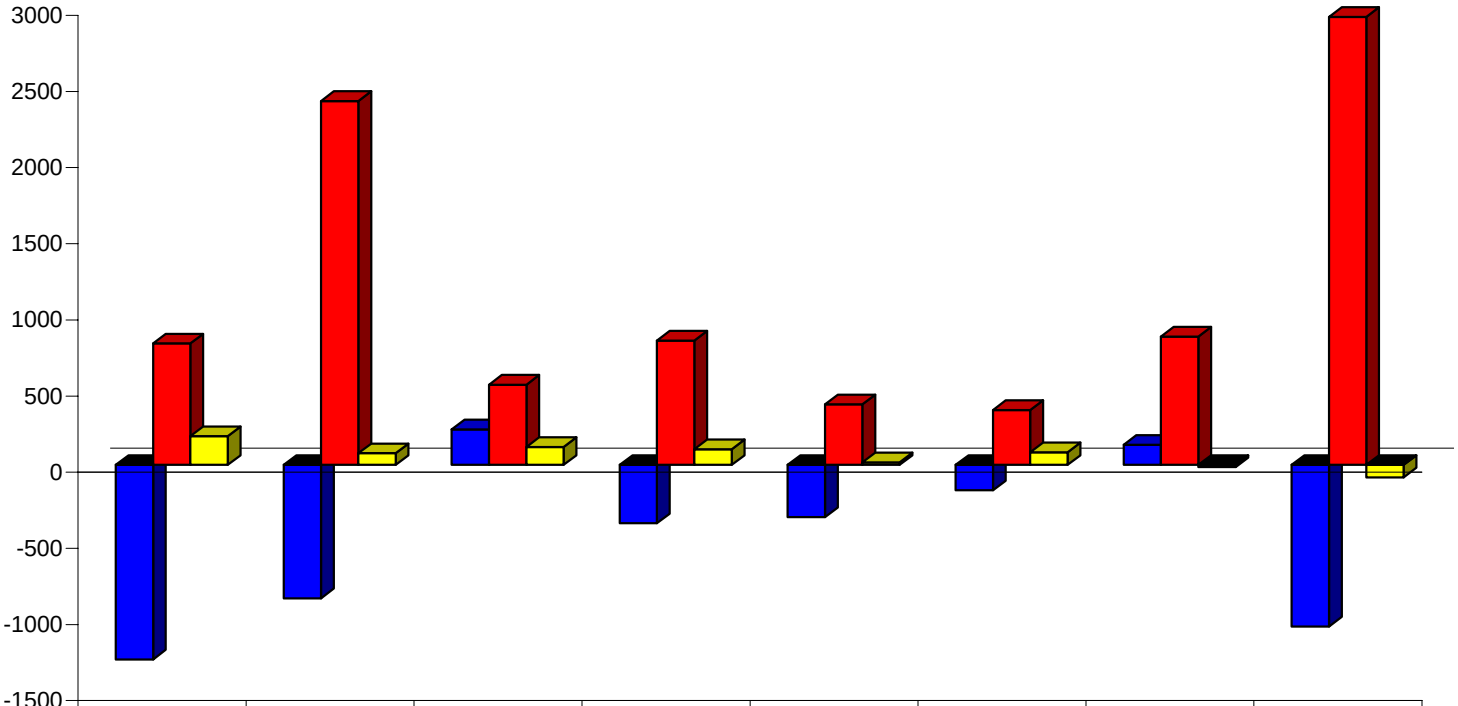


	TOTAL MANUFACTURING	WHOLESALE AND RETAIL TRADE; REPAIRS	HOTELS AND RESTAURANTS	TRANSPORT AND STORAGE	POST AND TELECOMMUNICATIONS	FINANCE, INSURANCE	REAL ESTATE AND BUSINESS SERVICES	COMMUNITY, SOCIAL AND PERSONAL SERVICES
PROD	-2024,6759	-1744,683	-445,1414	-246,8956	-289,3295	-463,7192	-1411,458	-1388,7014
DEM	1047,0586	1952,0669	602,4362	177,6276	319,2134	536,4731	2037,2826	296,247
INT_IND_INTD	-335,5902	466,8162	-139,0685	131,6761	34,3994	309,7381	443,8076	1066,2153

Total Manufacturing comprises: Agiculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC 3), Public Utilities (ISIC 4), Construction (ISIC 5)

PRD: Productivity Growth Effect (Darj Shade, negative), DEN: Demand Growth Effect (Dark Shade, positive), INT_IND: Industry Linkages (pale shade).

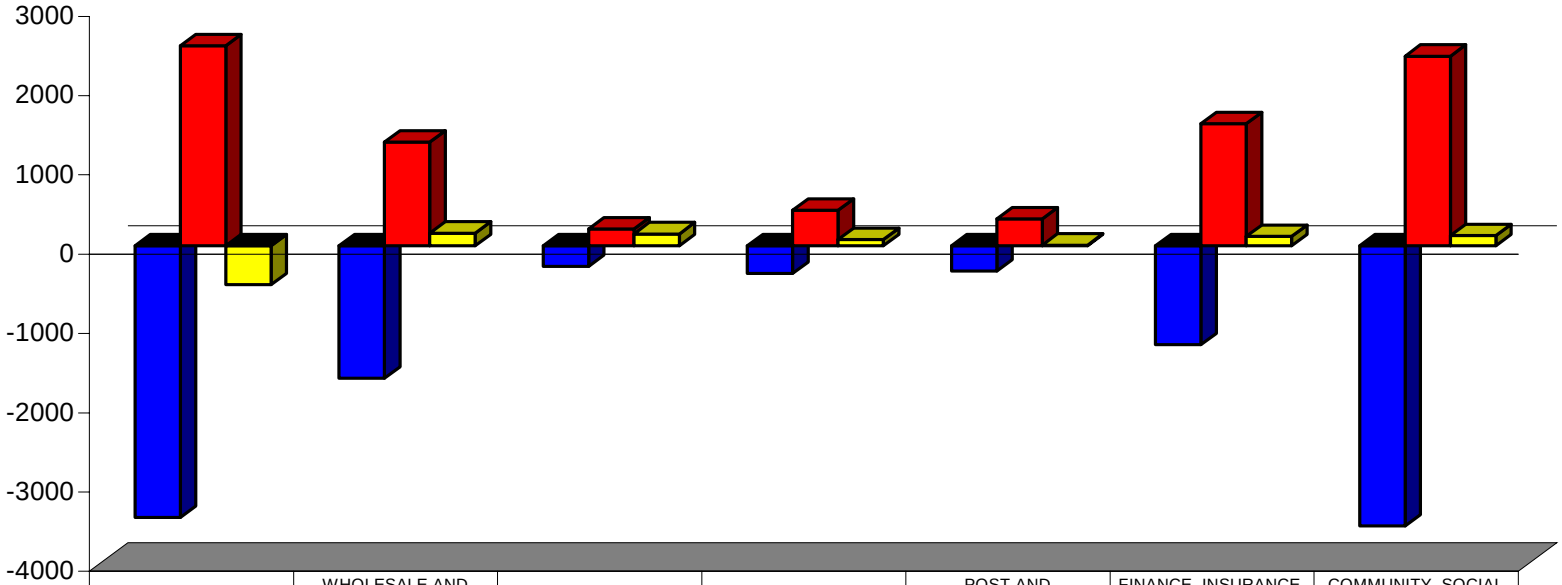
Figure 19: Decomposition of Employment Change in the VIS due to Consumption, Germany 1995-1978 (thousands of FTEs; constant prices)



	TOTAL MANUFACTURING	WHOLESALE AND RETAIL TRADE; REPAIRS	HOTELS AND RESTAURANTS	TRANSPORT AND STORAGE	POST AND TELECOMMUNICATIONS	FINANCE, INSURANCE	REAL ESTATE ACTIVITIES, AND BUSINESS SERVICES	COMMUNITY, SOCIAL AND PERSONAL SERVICES
PROD	-1277,1225	-874,7255	234,07	-382,9706	-342,3855	-166,6801	132,426	-1060,2553
DEM	797,7777	2390,0024	527,7698	817,395	398,3029	360,4117	842,3774	2941,581
INT_IND_INTD	188,9145	77,2984	118,3563	103,4912	17,0497	83,252	-14,7308	-81,0504

Total Manufacturing comprises: Agiculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC 3), Public Utilities (ISIC 4), Construction (ISIC 5)
PRD: Productivity Growth Effect (Darj Shade, negative), DEN: Demand Growth Effect (Dark Shade, positive), INT_IND: Industry Linkages (pale shade).

Figure 20: Decomposition of Employment Change in the VIS due Consumption among Demand, Labour Productivity and Structural Change, France 1995 - 1977

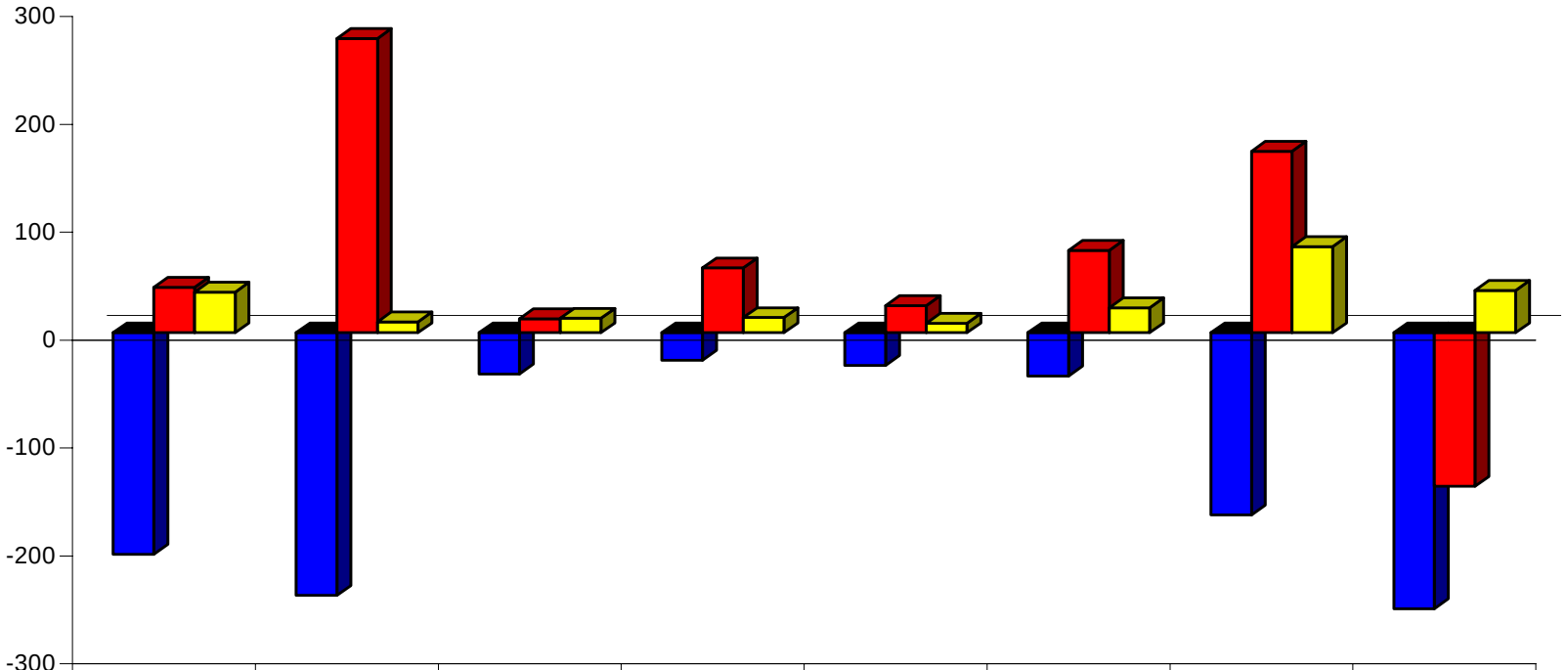


	TOTAL MANUFACTURING	WHOLESALE AND RETAIL TRADE; REPAIRS	HOTELS AND RESTAURANTS	TRANSPORT AND STORAGE	POST AND TELECOMMUNICATIONS	FINANCE, INSURANCE, REAL ESTATE AND BUSINESS SERVICES	COMMUNITY, SOCIAL AND PERSONAL SERVICES
PROD	-3426,7623	-1672,8333	-261,7144	-351,2882	-321,5696	-1251,221	-3536,5813
DEM	2520,63	1306,5662	209,0013	447,1149	339,7508	1536,5745	2391,0831
INT_IND_INTD	-492,6689	159,2042	148,512	77,8906	6,0845	115,4659	125,018

Total Manufacturing comprises: Agiculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC 3), Public Utilities (ISIC 4), Construction (ISIC 5)

PRD: Productivity Growth Effect (Darj Shade, negative), DEN: Demand Growth Effect (Dark Shade, positive), INT_IND: Industry Linkages (pale shade).

Figure 21: Decomposition of Employment Change in the VIS due to Consumption among Demand, Labour Productivity and Structural Change, The Netherlands 1997 - 1986

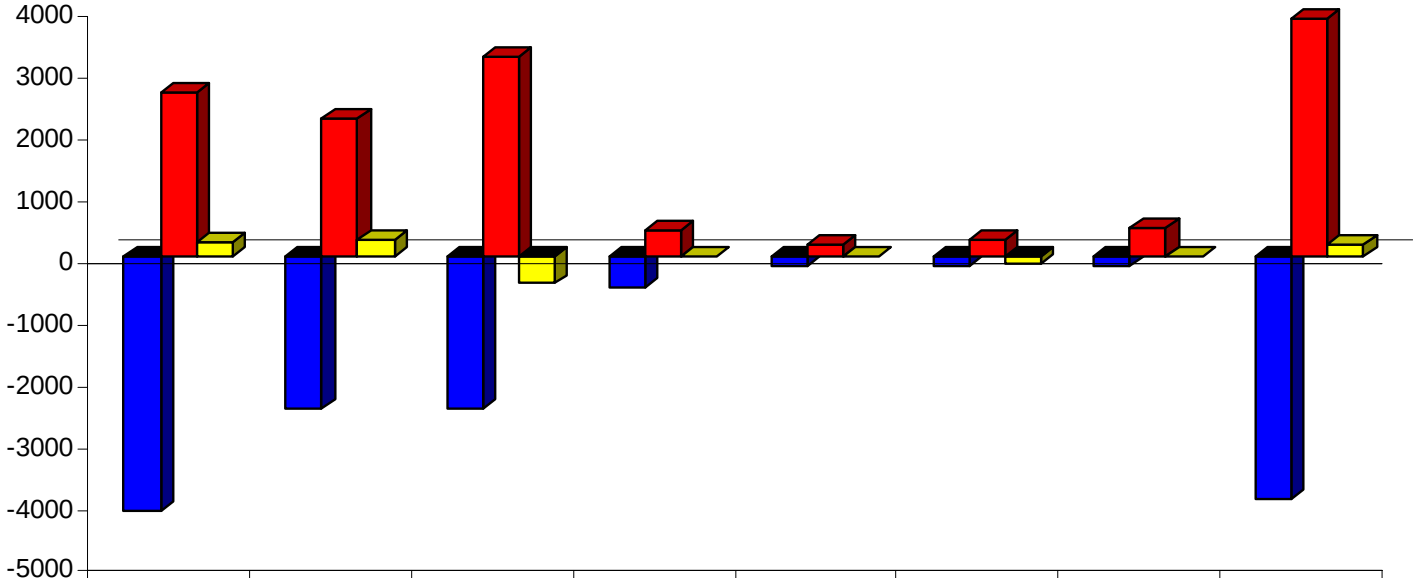


	TOTAL MANUFACTURING	WHOLESALE AND RETAIL TRADE; REPAIRS	HOTELS AND RESTAURANTS	TRANSPORT AND STORAGE	POST AND TELECOMMUNICATIONS	FINANCE, INSURANCE	REAL ESTATE AND BUSINESS SERVICES	COMMUNITY, SOCIAL, AND PERSONAL SERVICES
PROD	-205,2991	-243,5087	-38,2027	-25,4669	-30,2439	-40,1714	-168,9356	-255,8874
DEM	42,0163	272,7261	12,9331	60,1755	25,198	76,31	168,0723	-142,348
INT_IND_INTD	37,5544	10,1509	13,4695	14,1069	8,7389	23,2786	79,912	39,2625

Total Manufacturing comprises: Agiculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC 3), Public Utilities (ISIC 4), Construction (ISIC 5)

PRD: Productivity Growth Effect (Darj Shade, negative), DEN: Demand Growth Effect (Dark Shade, positive), INT_IND: Industry Linkages (pale shade).

Figure 22: Decomposition of Employment Change in the VIS from Consumption among Demand, Labour Productivity and Structural Change, Spain 1995 - 1980



	TOTAL MANUFACTURING	WHOLESALE AND RETAIL TRADE; REPAIRS	HOTELS AND RESTAURANTS	TRANSPORT AND STORAGE	POST AND TELECOMMUNICATIONS	FINANCE, INSURANCE	REAL ESTATE, BUSINESS SERVICES	COMMUNITY, SOCIAL AND PERSONAL
PROD	-4114.3682	-2462.7784	-2466.0935	-499.0795	-165.4822	-154.57	-168.0485	-3942.0045
DEM	2661.2673	2226.1562	3258.3708	440.8377	178.3757	275.3821	448.5678	3858.998
INT_IND_INTD	229.4084	285.2525	-443.7738	10.7858	15.1413	-118.4322	18.1753	179.6515

Table 1. Rank Correlation Coefficients of VIS Employment-Intensities.

(i) Within countries

US	**1997**	**1990**	**1977**	**UK**	**1998**	**1990**	**1979**
1997	1			1998	1		
1990	0.871	1		1990	0.671	1	
1977	0.705	0.815	1	1979	0.736	0.856	1

GERMANY	**1995**	**1990**	**1978**	**FRANCE**	**1995**	**1990**	**1977**
1995	1			1995	1		
1990	0.816	1		1990	0.719	1	
1978	0.720	0.766	1	1977	0.713	0.955	1

NL	**1997**	**1986**	**1977**	**SPAIN**	**1995**	**1990**	**1980**
1997	1			1995	1		
1986	0.891	1		1990	0.786	1	
1977	0.826	0.947	1	1980	0.770	0.863	1

(ii) Across countries 1995-98

	US	**UK**	**GERMANY**	**FRANCE**	**NL**	**SPAIN**
US	1					
UK	0.630	1				
GERMANY	0.545	0.762	1			
FRANCE	0.570	0.724	0.836	1		
NL	0.614	0.844	0.775	0.732	1	
SPAIN	0.740	0.751	0.863	0.824	0.794	1

Table 2. Share of Services in Final Demand and Household Consumption (%)
(constant prices of final year, except Spain current prices)

	FINAL DEMAND			CONSUMPTION		
	Late 1990s	**1990**	**Late 1970s**	**Late 1990s**	**1990**	**Late 1970s**
US	62.7	59.5	57.1	81.2	79.2	74.0
UK	59.3	53.9	50.8	73.2	68.5	65.7
GERMANY	48.0	37.1	34.8	71.4	61.3	54.6
FRANCE	53.3	47.1	42.3	66.7	66.1	64.7
NL	54.1	41.8	38.5	81.3	69.6	66.4
SPAIN	61.9	60.4	57.7	85.5	84.3	78.5

Services comprise: Wholesale Retail and Trade, Hotel and Restaurants (ISIC 6), Transport and Communications (ISIC 7), Finance and Insurance, Real Estate and Business Services (ISIC 8), and Community and Personal Services (ISIC 9).

US 1997 US$; UK: 1998 £; Germany: 1995 DM; France: 1995 FF; The Netherlands: 1997 GLD; Spain: 1995 Pesetas.

Table 3. Average Employment in the VIS activated by 1m. Injection of Final Demand to Manufacturing and Services
(local currency, end-year prices)

		Manufacturing	Services	
US	1997	13.30	12.23	
	1990	18.96	16.59	
	1977	38.56	36.54	
UK	1998	24.51	20.63	
	1990	48.90	43.16	
	1979	132.33	112.80	
GERMANY	1995	8.79	10.74	
	1990	10.21	12.90	
	1978	17.87	18.83	
FRANCE	1995	1.92	2.65	
	1990	2.85	3.92	
	1977	9.53	13.50	
NL*	1997	5.29	7.41	5.03
	1986	10.89	10.97	6.87
	1977	19.23	16.47	11.81
SPAIN	1995	0.14	0.14	
	1990	0.21	0.20	
	1980	0.59	0.70	

Manufacturing comprises: Agriculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC3), Public Utilities (ISIC 4), and Construction (ISIC 5). Services comprise: Wholesale Retail and Trade, Hotel and Restaurants (ISIC 6), Transport and Communications (ISIC 7), Finance and Insurance real estate and business services (ISIC 8), and Community and Personal Services (ISIC 9).

** Figures in the additional column exclude Other Manufacturing.*

Table 4. Jobs Retained Within the Sector and the Extent of the Spillovers to the Rest of the Economy (shares)

		Retained in Manuf.	Spillovers from Manufacturing to		Retained in Services	Spillovers from Services to	
			Manuf.	Services		Manuf.	Services
		(1)	(2)	(3)	(4)	(5)	(6)
US	**1997**	0.50	0.19	0.31	0.71	0.10	0.20
	1990	0.51	0.21	0.28	0.72	0.09	0.18
	1977	0.52	0.24	0.24	0.73	0.12	0.15
UK	**1998**	0.57	0.16	0.27	0.72	0.07	0.21
	1990	0.54	0.15	0.31	0.72	0.07	0.21
	1979	0.56	0.20	0.24	0.76	0.10	0.14
GERMANY	**1995**	0.58	0.18	0.24	0.78	0.08	0.14
	1990	0.57	0.20	0.23	0.78	0.09	0.14
	1978	0.59	0.24	0.16	0.74	0.14	0.12
FRANCE	**1995**	0.57	0.18	0.25	0.84	0.06	0.10
	1990	0.53	0.16	0.31	0.81	0.05	0.14
	1977	0.58	0.21	0.22	0.81	0.08	0.11
NL	**1997**	0.59	0.13	0.29	0.77	0.06	0.18
	1986	0.65	0.15	0.20	0.83	0.05	0.12
	1977	0.66	0.18	0.16	0.83	0.07	0.11
SPAIN	**1995**	0.55	0.21	0.24	0.76	0.11	0.13
	1990	0.62	0.21	0.17	0.75	0.13	0.12
	1980	0.62	0.24	0.14	0.69	0.20	0.11

Manufacturing comprises: Agriculture (ISIC 1), Mining and Quarrying (ISIC 2), Manufacturing (ISIC3), Public Utilities (ISIC 4), and Construction (ISIC 5). Services comprise: Wholesale Retail and Trade, Hotel and Restaurants (ISIC 6), Transport and Communications (ISIC 7), Finance and Insurance, Real Estate and Business Services (ISIC 8), and Community and Personal Services (ISIC 9).

Table 5. Employment Effects of Alternative Final Demand Vectors
(% of late 1990s employment level)

Current Prices

	STEP 1 Service Mix	STEP 2 Service Share	STEP3 Manuf Mix	TOTAL Final Demand Mix	
US (1997-77)	2.63	-2.61	1.58	1.60	
UK (1998-79)	-3.06	-4.79	0.08	-7.76	
GERMANY (1995-78)	-10.95	-1.24	-0.30	-12.48	
FRANCE (1995-77)	-4.62	-4.12	2.62	-6.13	
NL (1997-77)	-2.37	-4.71	-2.72	-9.80	
SPAIN (1995-80)	-3.09	-0.94	1.89	-2.14	
	Constant Prices (final year prices)				
US (1997-77)	-0.31	-0.99	1.31	0.02	
UK (1998-79)	-2.39	-2.33	0.73	-3.99	
GERMANY (1995-78)	-10.20	-1.81	-0.66	-12.67	
FRANCE (1995-77)	-5.16	-2.86	4.38	-3.64	
NL (1997-77)	-3.16	-3.64	-5.45	-12.24	(97-86)
SPAIN (1995-80)	-	-	-	-	

STEP 1: late 1990s total FD, late 1990s manufacturing mix, late 1990s service share in final demand, late 1970s service mix

Table 6. Employment Effects of Alternative Consumption Vectors
(% of late 1990s employment level)

	STEP 1 Service Mix	STEP 2 Service Share	STEP 3 Manuf Mix	TOTAL Final Demand Mix	
	Current Prices				
US (1997-77)	0.83	-3.19	1.20	-1.15	
UK (1998-79)	6.99	-7.34	2.55	2.20	
GERMANY (1995-78)	-2.26	-1.43	0.52	-3.16	
FRANCE (1995-77)	4.98	-2.94	1.79	3.83	
NL (1997-77)	7.60	-6.02	-0.26	1.32	
SPAIN (1995-80)	0.13	-0.88	0.24	-0.51	
	Constant Prices (final year prices)				
US (1997-77)	-3.01	-1.42	0.19	-4.24	
UK (1998-79)	7.88	-3.59	1.58	5.87	
GERMANY (1995-78)	-0.76	-1.99	-0.51	-3.25	
FRANCE (1995-77)	4.18	-0.88	3.86	7.16	
NL (1997-77)	6.18	-3.43	-4.05	-1.30	(97-86)
SPAIN (1995-80)	-	-	-	-	

STEP 1: late 1990s total FD, late 1990s manufacturing mix, late 1990s service share in final demand, late 1970s service mix

STEP 2: late 1990s total,late 1990s manufacturing mix, late 1970s service share in household consumption, late 1970s service mix

STEP 3: late 1990s total, late 1970s manufacturing mix, late 1970s service share in household consumption, late 1970s service mix

Table 7. Effect of Alternative (Country) Final Demand Vectors on US Employment
(% of US employment)

	STEP 1 Service Mix (1)	STEP 2 Service Share (2)	STEP 3 Manuf Mix (3)	TOTAL Final Demand Mix (4)
Country				
UK	3.04	-2.40	0.85	1.49
GERMANY	2.93	-1.66	0.69	1.95
FRANCE	7.48	-2.03	-0.24	5.21
NL	4.32	-1.46	2.93	5.78
SPAIN	1.16	-1.42	2.84	2.58

STEP 1: US total, US manufacturing mix, US service share in final demand, country service mix

STEP 2: US total, US manufacturing mix, country service share in final demand, country service mix

STEP 3: US total, country manufacturing mix, country service share in final demand, country service mix

Table 8. Effect of US Final Demand Vectors on Employment in European Economies
(% of country employment)

	STEP 1 Service Mix	STEP 2 Service Share	STEP 3 Manuf Mix	TOTAL Final Demand Mix
Country				
UK	-6.10	0.59	1.47	-4.03
GERMANY	-10.50	1.48	-0.03	-9.05
FRANCE	-5.16	1.84	0.18	-3.14
NL	-6.77	2.03	1.41	-3.32
SPAIN	-5.96	-0.12	-2.65	-8.73

STEP 1: country total, country manufacturing mix, country service share in final demand, US service mix

STEP 2: country total, country manufacturing mix, US service share in final demand, US service mix

STEP 3: country total, US manufacturing mix, US service share in final demand, US service mix

Table 9. Employment Effect of Alternative (Country) Consumption Vectors
(% of US employment)

	STEP 1 Service Mix	STEP 2 Service Share	STEP 3 Manufacturing Mix	TOTAL Consumption Mix
		% of employment from consumption activities		
Country				
UK	1.85	-1.61	0.54	0.78
GERMANY	-5.09	-1.13	0.90	-5.33
FRANCE	-7.01	-1.45	0.94	-7.52
NL	-3.63	0.01	-0.19	-3.81
SPAIN	-3.21	-1.16	2.51	-1.86
		% of total employment		
Country				
UK	1.24	-1.08	0.36	0.52
GERMANY	-3.42	-0.76	0.60	-3.57
FRANCE	-4.71	-0.97	0.63	-5.05
NL	-2.44	0.01	-0.13	-2.56
SPAIN	-2.15	-0.78	1.68	-1.25

STEP 1: US total, US manufacturing mix, US service share in consumption, country service mix

STEP 2: US total, US manufacturing mix, country service share in consumption, country service mix

STEP 3: US total, country manufacturing mix, country service share in consumption, country service mix

Table 10. Employment Effect of the US Consumption Vector
(% of country employment)

	STEP 1 Service Mix	STEP 2 Service Share	STEP 3 Manufacturing Mix	TOTAL Consumption Mix
	% of employment from consumption activities			
Country				
UK	3.44	2.56	0.01	6.01
GERMANY	5.80	1.28	-0.75	6.33
FRANCE	6.37	4.17	-0.62	9.92
NL	10.66	-0.03	-0.25	10.39
SPAIN	-4.08	-0.43	-2.65	-7.16
	% of total employment			
Country				
UK	1.67	1.24	0.00	2.91
GERMANY	2.58	0.57	-0.34	2.82
FRANCE	2.92	1.91	-0.29	4.54
NL	3.09	-0.01	-0.07	3.01
SPAIN	-2.14	-0.23	-1.39	-3.75

STEP 1: country total, country manufacturing mix, country service share in consumption, US service mix

STEP 2: country total, country manufacturing mix, US service share in consumption, US service mix

STEP 2: country total, US manufacturing mix, US service share in consumption, US service mix

Table A1. The Allocation of Employment by Vertically Integrated Sectors:
A Numerical Example

	X1	X2	X3	Intermediate sales	Final demand	Gross output	Employment
X1	70	30	15	115	110	225	10
X2	30	25	30	85	126	211	20
X3	50	20	25	95	55	150	80
Total intermediate use	150	75	70				
Value added	75	136	80		291		
Gross output	225	211	150		291		

(I-A)			**B = (I - A)$^{-1}$**		
0.69	-0.14	-0.10	1.59	0.28	0.26
-0.13	0.88	-0.20	0.35	1.23	0.34
-0.22	-0.09	0.83	0.46	0.22	1.31

Employment coefficient (n)			**B*FD**			**Final Demand (FD)**		
0.044	0	0	174.92	35.83	14.25	110	0	0
0	0.095	0	38.02	154.51	18.47	0	126	0
0	0	0.533	50.97	27.13	71.90	0	0	55

	n*B*FD			**Employment** (row sum)
	7.77	1.59	0.63	10
	3.60	14.65	1.75	20
	27.18	14.47	38.35	80
Employment (column sum)	38.56	30.71	40.73	110

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Ronald Schettkat and Lara Yocarini (Jan. 2003)

DEMPATEM in Perspective. State of the Art in the Analysis of Structural Changes.

Book in preparation:

The US-European gaps in Demand and Employment

Wiemer Salverda and Ronald Schettkat, ed.

Working Papers: (See list below)

LIST OF WORKING PAPERS

Working papers are downloadable at http://www.uva-aias.net/lower.asp?id=194

1. **John Schmitt,** Estimating Household Consumption Expenditures in the United States using the Interview and Diary Portions of the 1980, 1990, and 1997 Consumer Expenditure Surveys
2. **Laura Blow,** Household Expenditures Patterns in the UK
3. **Adriaan Kalwij & Wiemer Salverda,** Changing Household Demand Patterns in the Netherlands: Some Explanations
4. **Javier Ruiz-Castillo & María José Luengo-Prado,** Demand Patterns in Spain
5. **Marijke van Deelen & Ronald Schettkat,** Household Demand Patterns in West Germany:1978-1993*
6. **Francois Gardes & Christophe Starzec,** Household Demand Patterns in France 1980-1995
7. **Francois Gardes & Christophe Starzec,** Income Effects on Services Expenditures
8. **Adriaan Kalwij & Steve Machin,** Changes in Household Demand Patterns: A Cross-Country Comparison
9. **Laura Blow, Adriaan Kalwij & Javier Ruiz-Castillo**, Methodological issues on the analysis of consumer demand patterns over time and across countries
10. **Mary Gregory & Giovanni Russo,** The Employment Impact of Differences in Demand and Production Structures
11. **Ronald Schettkat (Research Assistance: Joep Damen)** Demand Pattterns and Employment Structures, An Aggregate Analysis
12. **Andrew Glyn, Wiemer Salverda, Joachim Möller, John Schmitt, Michel Sollogoub** Employment differences in services the role of wages, productivity and demand
13. **Ronald Schettkat & Wiemer Salverda,** Demand Patterns and Employment Growth Consumption and Services in France, Germany, the Netherlands, the United Kingdom and the United States Concluding Summary