

EMPLOYMENT GROWTH, STRUCTURAL CHANGE AND CAPITAL
ACCUMULATION

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Abstract

The past century has seen the decline of the importance of agriculture, and the past 25 years a declining share of jobs provided by the industrial sector. The labour market has also adjusted to variations in the growth of the population of working age, migration and changes in the participation rates of women and of men. This paper examines these trends for a sample of OECD countries with a particular focus on the impact of capital accumulation in shaping these processes. It analyses how employment in industry and in services, and for men and women, has reacted differently to accumulation and to the expansion of the labour supply. This allows a picture to be built up of how structural change has affected the relative employment performance of Europe and the USA.

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EMPLOYMENT GROWTH, STRUCTURAL CHANGE AND CAPITAL ACCUMULATION

Declining agriculture and, more recently, deindustrialisation and the expansion of services have shaped the labour market performance of individual OECD countries and the different experience of men and women. It is now widely accepted that there is a strong structural component to unemployment and non-employment in OECD countries. The purpose of this paper is to examine this process of structural change and in particular how capital stock growth, for the classical economists the central indicator of the dynamism of the economy, affects the capacity of industry and services to absorb the labour supply. The relationship of population growth to employment is examined first, with section 2 considering the decline in agriculture and section 3 the influences on non-agricultural employment as a whole. Section 4 analyses the divergent behaviour of industry and services and section 5 looks at the relationship between structural change and employment performance as a whole, focussing on the comparative experience of Europe and the USA since 1973.

The basic labour market data set is for a sample of OECD countries, based on Maddison's series, supplemented by estimates of the gender split of employment, and updated from OECD sources (see data Appendix). Maddison's data goes back to 1870, and some of the charts include some estimates for that year; but the 1870 data are particularly rough and the statistical analysis is confined to the three sub-periods 1913-50, 1950-73 and 1973-94, mostly with a restricted sample of 8 countries (G7 plus Netherlands) for which capital stock data are available¹. The Appendix provides a number of tables with country detail for employment trends, including sectoral shares and shares for men and women separately.

1. Employment and Population

How completely employment adjusts to variations in population growth reflects the functioning of labour markets. If they were really flexible then shifts in the labour supply would be proportionately reflected in employment growth as wages adjusted to whatever extent was necessary. This section examines whether employment trends over the past 80 years conform to this view.

Population of working age (15-64 years old termed "population" in what follows) in the advanced countries as a whole has grown at a pretty steady 1% per year over the past 120 years (Appendix table 1). It was a little faster in the "golden age" (1950-73) and slowed down only modestly after 1973 (except for Japan where the decline was marked). Since 1913 population has grown about twice as fast in the USA as in Europe. Figure 1 shows a close correlation between employment growth and population growth for OECD countries pooling three periods covering the past 80 years. A simple regression (table 1 equation 1) can account for 80% of the variance of employment growth by population change and suggests an elasticity of nearly 1.2; the small negative constant implies that employment tended to grow slower than population when population was growing at less than 1% a year.

These population trends were not entirely exogenous since immigration responds to some degree to labour demand, particularly over the long periods analysed here. Such an effect will bias upward the coefficient of population growth and lead to an exaggerated estimate of how readily additions to the labour force are absorbed into jobs. Appendix table 2 shows the contribution of migration to total population growth². The US, Canada and Australia have consistently received substantial inflows of migrants. After 1950 Europe was transformed from a supplier of people to a net recipient; West Germany led the way with immigration contributing much of its population growth. Inward migration cannot

explain the considerably faster growth in population of working age in the USA as compared to Europe.

If the population is adjusted for migration flows this gives a “natural” or “national” growth of population of working age (“natpop” allows either interpretation). The scatter between employment and natpop is less tight than when actual population of working age is used (figure 1) reflecting the variability of migration. A panel regression of employment growth on population may also be affected by persistent country effects; if countries with rapid population growth “happen” to have faster increases in participation than the average (and this has definitely been the case with North America amongst the vanguard in women’s participation) then the genuine impact of population on employment would be exaggerated. Accordingly it seems best to sweep out any such effects by including a full set of country dummies, and parallel considerations indicate that time dummies should be included as well. Finally a “catch-up” term is included, the ratio of employment to population at the beginning of the period; this captures the fact that women’s participation in particular had the potential to rise more where it was still low. In this sense the catch-up term is an additional indicator of labour supply.

The result of all these modifications (table 1 equation 2) is a halving of the estimated elasticity of employment with respect to population; at 0.61 it is significantly less than 1. Adding the country and time dummies cuts the elasticity by about one quarter, with the rest of the fall being the result of adjusting for migration. The catch-up term, whilst highly significant, does not much affect the elasticity. So changes in the natural rate of population growth within countries over the past 80 years do not seem to have been fully reflected in employment growth, even over the long run³. The country dummies suggest persistently weak employment growth in a number of European countries, including France and Italy; the time dummies confirm that employment growth was especially strong during 1950-73.

The patterns for total employment described above combine the very divergent experience of men and women. Male employment responded to natural population growth with an elasticity of slightly above 1; the North American employment record was ordinary and employment growth overall was weaker after 1973 (equation 3). For women (equation 4) the elasticity was only 0.43 (and not significant), North American and Australian employment growth stands out and employment generally expanded much faster after 1950 (an additional 1% per year relative to population growth).

It is tempting to conclude that where population growth speeded up the men found jobs but the employment rate of women declined as proportionately more jobs were not generated. However there is a serious problem with the measurement of rural women's employment and such a conclusion must be provisional until the position of agriculture has been analysed.

2. Agriculture

Analyses of economic development have typically regarded the decline in agriculture as moving labour from where its average productivity is very low to the "modern sector" of industry and services where incomes per head are much higher. As late as 1960 agricultural incomes were typically less than one half those in industry and services⁴. Thus agriculture still represented an important source of surplus labour which could move into the "non-agricultural population" available for work in the modern sector.

The size of this reserve is not straightforward to calculate since countries have differed widely in the extent to which rural women were engaged in agriculture – in 1950 for example women made up 55% of those recorded as working in agriculture in Germany but only 8% in Sweden. Whilst demographic differences and farming practices might explain some part of such variations, the root cause was differing conventions

about the employment status of rural women in the national statistics (and even over time - see Maddison 1982 p 192). Such variation makes employment a misleading indicator of reserves of labour in agriculture and also distorts comparisons of employment trends for women when agriculture declines⁵.

Men's employment is a more consistent measure of the proportion of the population dependent on agriculture; this measure can be extended to include rural women by taking as the "agricultural population" twice the number of men working in agriculture. Expressed as a percentage of the population of working age this gives an index of degree of involvement in agriculture⁶. Whereas in 1913 around one third of the population of the advanced countries were still in the agricultural sector, by 1973 the proportion had shrunk to well under 10% (figure 2). In Japan and Italy the decline was much greater; in the UK it occurred much earlier (Appendix table 3). After 1973 the decline of the agricultural share was less significant.

The size of the shift out of agriculture seems to have depended both on the demand from the modern sector of the economy and the extent of the agricultural reserves. The decline in the ratio of male agricultural employment to population of working age tended to be larger when the rate of growth of the economy's capital stock was higher and when the non-agricultural sector was small (table 2), but the coefficients were only significant at about the 10% level. Given these factors, the dummies suggest that the decline in agriculture was especially fast in France and Italy, but that the run-down during 1950-73 was not much greater than could be accounted for by the high rate of accumulation.

Surprisingly perhaps the decline in the importance of agriculture contributed little more to the growth of the non-agricultural population during the golden age than it did during the "trans-war" period 1913-1950 (figure 2 bottom panel). Although the percentage rate of decline of agriculture was faster after 1950, the agricultural population was so

much larger in 1913 that even a more modest proportional exodus yielded a comparable number of recruits to the non-agricultural population. After 1973 the decline in agriculture continued, but from such a reduced level that it contributed far less to the growth rate of the urban population. In Japan, where the shrinkage in agriculture had been so spectacular in the golden age, its potential for supplying labour was much diminished after 1973 and urban population growth slowed from 3.3% per year to 1.0% per year (Appendix table 4).

3. Non-Agricultural Employment and Capital Accumulation

The clearest indicator of the provision of jobs in the modern sector of the economy is the ratio of employment to non-agricultural population of working age. These "urban" employment rates fell until 1950 and then crept up (figure 3). Men's employment rates fell pretty steadily overall whilst women's employment only rose after 1950. After 1973 the employment rate rose sharply in Japan and the USA as men's employment rates stabilised and women's employment rose rapidly; but in Europe it fell back as men's employment rate fell by a full 12% points and women's increased only half as fast as in the USA (8% points against 18% points). Whereas in 1973 the employment rate in Europe was similar to that in the USA and a little below Japan's, by 1994 it was 11% points lower than either (Appendix table 5).

Do differences in the growth of non-agricultural employment reflect capital accumulation as the classical economists believed? Angus Maddison has provided data on the (non-residential) capital stock covering the past century for 8 countries (G7 and Netherlands)⁷. Table 3 presents unweighted averages covering four sub-periods and records the highest and lowest growth rates in the sample. This is the series used in the previous section as an indicator of the pulling power of the urban sector on labour reserves in agriculture.

Table 3 highlights the exceptionally low rate of accumulation in the inter-war period followed by unprecedented growth during the golden age, together with the persistently impressive performance of Japan and weak accumulation in the UK. The swings in non-agricultural employment growth seem to follow accumulation; figure 4 shows quite a significant looking relationship over the past 120 years. The question, however, is whether capital stock growth has any independent influence on employment, or whether it simply responds to the labour supply via the neoclassical mechanism of flexible wages and capital-labour ratios. In the latter case capital stock growth would reflect such influences as population growth, a shift out of agriculture or rises in women's participation, but would not be responsible for them. By contrast in the classical approach the limits placed on employment by the labour supply need not bind and employment trends in the modern sector would depend on the dynamism of accumulation. The growth rate of the capital stock is subject to endogenous forces (unemployment bringing a higher profit share and investment – see Rowthorn 1998) but it may be affected by other influences in the medium run and thus have an independent impact on employment trends.

Table 4 summarises the results of an analysis of factors affecting non-agricultural employment. Natural population growth is taken as the fundamental labour supply measure; here the issue is whether it has a proportionate influence on employment trends in the modern sector or whether the impact has been less than proportionate as suggested earlier. Two catch-up terms are included to capture additional aspects of the potential labour supply for non-agricultural employment. The first is the initial share of population outside agriculture (nonagpopsh) – the higher this is the smaller the potential for workers to move from the countryside. The second is the initial employment rate in the non-agricultural sector (emp/popnonag) – again the higher this is, the less there is potential for greater labour force participation or reduced unemployment (or the more potential for reduced participation in the case of men). These catch-up terms would be expected to have negative

signs if the size of the potential labour supply has had a systematic effect on employment growth. By including these indicators of various aspects of the labour supply it should be possible to see whether capital stock growth does constitute an additional influence on employment.

Regression 1 of table 4 presents the results for non-agricultural employment as a whole. Capital stock growth has a highly significant impact with an elasticity of 0.23. Population growth has a strongly significant effect on employment growth but with an elasticity of nearly 0.7. Both the catch-up terms have the expected negative signs and are highly significant; so countries which still had a higher share of agriculture tended to have faster growth of non-agricultural employment as did countries with lower initial employment rates.

Men and women (equations 2 and 3) are rather similarly affected by population growth, and the individual coefficients are not significantly different from 1 (though they are a bit smaller). The initial employment rate has a large impact on both men and women's employment; not surprisingly participation rates were subject to "catch-up" effects and these seem to have been especially strong for women. But beyond this the experiences of women and men differed. Men's employment was very responsive to both capital stock and the initial population share outside agriculture. But women's employment appears independent of these influences; the irrelevance of the size of the agricultural sector may be because women tended not to participate in the labour market when they moved into the towns⁸.

4. Industry and Services

Alongside the different experiences of men and women, and contributing to them, has been the divergent behaviour of industry and services. The phenomenon of deindustrialisation - a declining share of industrial in total employment - began in the late 1960s and early 1970s. But this measure is intertwined with the decline in agriculture; a better

indicator of the importance of industry in the provision of jobs to the modern sector is given by the ratio of industrial employment to the non-agricultural population. Figure 5 shows how industry has provided a consistently declining share of work for the non-agricultural population in the advanced countries as a whole. The rate of decline accelerated after 1973; the share falling by 7% points as compared to only 2% points over the previous 20 years. In Europe the decline became precipitate after 1973, bringing a fall of 10% points by 1994 (see Appendix table 7 for detail).

The decline in industrial employment was particularly disastrous for men. Although the proportionate fall in European industrial employment was similar for men and women, male industrial jobs were much more important (in 1973 representing 48% of total men's employment whilst only 28% of employed women worked in industry). Industrial decline contributed 15% points to the decline in the employment rate for men over the period 1973-94, whereas for women the contribution was less than 5% points.

Services employment moved in line with the urban population until 1950 after which it provided an increasing proportion with jobs (figure 6 and Appendix table 8). The increase of service employment accelerated after 1973, but the rise was larger in the USA (12% points) than in Europe (7% points) or Japan (8% points). Women have been the main beneficiaries from the jobs created by the expansion of services. By 1994 women had more service jobs than men in both the USA (clearly) and Europe (just), in contrast the position in 1913 when there were around twice as many men employed in services as women. After 1973 women's employment rate in services rose 18% points in USA, as compared to 12% points in Europe and 11% points in Japan. In each case these increases far outweighed the declines in job opportunities for women in industry, leading to spectacular increases in the overall employment rate for women, especially in the USA.

The regressions in table 5 examine how these trends in industrial and service jobs were related to population and capital stock, following the analysis for total non-agricultural employment discussed above.

Aggregate capital stock has a very significant influence on the trend of industrial employment, with an overall elasticity of nearly 0.4. Apparently capital has a greater impact on women's employment in industry than men's (possibly reflecting their concentration in different industries). Population growth over the period as a whole has insignificant effect on industrial employment. Nor was a larger agricultural sector associated with faster growth of industrial jobs. Thus the size of the reserve army in agriculture was typically not a limiting factor on the growth of industrial employment. Presumably this was because industry represented the core of the primary labour market, which could draw on services for labour and was thus not dependent on employing workers directly from agriculture. However, both in aggregate and for men and women separately, industrial employment grew significantly faster when the initial (non-agricultural) employment rate was lower. This is rather surprising. If the other indicators of labour supply potential were irrelevant to industrial employment, why should a high employment rate, reflecting high labour force participation, imply a smaller subsequent rise (or larger fall) in industrial employment? Perhaps it is standing as a general index of development, which affects the share of industrial employment (see Rowthorn and Ramaswamy 1997).

The patterns for services are very different from employment trends in industry. Population growth has a very significant impact on services employment, both in total and for men and women separately (table 5 equations 4-6); estimated elasticities are never significantly different from 1. The size of the agricultural reserve and the employment rate in non-agriculture are also highly significant, suggesting that the services sector acts as a sponge with employment increasing more where the initial reserves of labour in agriculture and in non-participation were

greater. The one exception is that women's employment in services did not grow faster when the initial agricultural population was larger. This was presumably because the transfer of men from agriculture did not bring many additional women into the urban labour market. Capital stock growth is associated with faster growth of services employment, but the elasticity is about half of that of industry; moreover it seems to be only men's jobs in services which responded to capital stock growth. The most likely explanation for the different behaviour of services employment of men and women would again seem to be the differing importance of individual service sectors (such as the concentration of men in transport and communication).

The analysis reported above examined the influence of aggregate (non-residential) capital stock on employment in industry and services and provided strong confirmation for the finding by Rowthorn (1995) that capital accumulation had a bigger effect on employment in industry than in services. An obvious refinement is to look separately at the impact of accumulation within the two sectors. Unfortunately such data are only available for a few countries for the period prior to 1973; this indicates, however, that trends in capital stock growth in the golden age were pretty similar in industry and services (see Glyn 1997). After 1973 they diverged sharply in a number of countries with capital stock growth slackening in industry whilst being maintained in services. Accordingly a reasonable proxy for accumulation by sector can probably be obtained by using the aggregate figure before 1973 and the sector figure for the period after that.

If the regressions reported in table 5 are repeated using these "sector" accumulation rates the results are interesting. For the three industry regressions (1-3) capital stock coefficients are a little higher and more significant when the post-1973 accumulation rate in industry is substituted for aggregate accumulation. For services the substitution of service sector accumulation leaves capital stock insignificant in regression (4). This is because accumulation within services seems to

have a much stronger *negative* effect on employment of women in services (significant at the 10% level), than does accumulation in aggregate. It is not obvious why accumulation within services should destroy women's jobs more than men's unless some compositional factor is again at work. It seems that accumulation outside services has a positive effect on services employment, but that accumulation within services has little overall impact, with increases in jobs for men nearly offset by decreases for women.

This broad picture of the impact of capital stock growth can be confirmed analysing disaggregated data from the OECD's International Sectoral Database (11 industrial sub-groups and 6 services sub-groups for up to 14 countries and covering 1970-90, with labour supply aspects subsumed into country dummies). This suggests (table 6) for industry an elasticity of sub-group employment with respect to the sub-group capital stock of 0.22 (significant at the 0.1% level). For the pool of service sub-groups, capital stock growth within the sub-group is not significant, whilst capital stock growth in manufacturing appears to have a definite impact on services employment (a coefficient of nearly 0.4, almost significant at the 5% level).

5. Structural Change and Employment Patterns

The role of structural change in the deterioration of Europe's employment performance after 1973, and its poor showing in relation to the USA, is highlighted in table 7 which summarises some of the patterns described in this paper. The top rows record the decline in the growth rate of non-agricultural population in Europe after 1973 as the shift out of agriculture declined in importance; this meant a much slower growth rate of those requiring work outside agriculture. The core of the table analyses the provision of jobs in the modern sector. It splits changes in the non-agricultural employment rate in two ways. Firstly it shows the contributions of industry and services in providing jobs; then it shows how changes in the employment rate were reflected in changes

in unemployment and in economic inactivity (labour force participation). These decompositions are shown first for all workers, and then for men and women separately. The performance of Europe after 1973 is compared first to its earlier record in the 1950s and 1960s (column 3) and then to the US record after 1973 (column 5).

Services employment (in relation to the non-agricultural population) actually grew faster in Europe after 1973 than before. All the deterioration in employment performance (column 3) reflected the much sharper fall in industrial employment after 1973. This in turn meant that all the deterioration was suffered by men, with women gaining as much from the faster growth of service jobs as they lost from declining opportunities in industry. Comparison with the US after 1973 (column 5), shows that steeper decline in industrial jobs and slower increase in services contributed almost equally to the relatively poor employment performance of Europe. The faster decline in industry brought worse employment prospects for European men whilst the slower increase in service jobs accounts for slower employment growth for women in Europe.

The negative impact of deindustrialisation after 1973 is brought out by contrasting it with declining agriculture after 1950. The decline in agriculture during the golden age was associated with a parallel increase in employment outside agriculture – see figure 7. So, particularly for men, this was a “positive” type of structural change (in the sense of Rowthorn and Wells 1987) reflecting changing patterns of demand in the economy. The deindustrialisation of the post-1973 period has a quite different character – those countries where industrial employment declined most had the smallest increases in services employment (see figure 8). This does not establish a directly causal role for the decline in industry - both sectors could be responding to common causes in terms of aggregate demand or labour force participation for example. However it is obvious that industrial expansion tends to raise employment in services by increasing demand for the output of services, either as inputs

into manufacturing or to supply final demand resulting from higher incomes in manufacturing. The evidence is at least consistent with deindustrialisation, after 1973, reducing work done in services rather than freeing labour to flow into services.

This paper has concentrated on employment trends without analysing how "non-employment" was split into registered unemployment and economic inactivity. However table 7 shows that the deterioration in European employment after 1973 (column 3) was entirely reflected in rising unemployment (for men and women); inactivity for women fell much faster after 1973 and rose no faster for men. In comparison to the USA, however, the European record on inactivity was also extremely poor after 1973. It rose much more than in the USA for men and fell much less for women and this accounts for about two thirds of the relatively slow employment growth in Europe. Inactivity trends seem more consistently related to structural change than does unemployment. The extent of the rise in women's participation is strongly connected to the rise in women's employment in services (figure 9), though here the direction of causation can go both ways – rising labour force participation of women may have encouraged expansion of services as well as reflecting it. More straightforward is the fact that increases in male inactivity were positively and closely related to the loss of industrial jobs (figure 10); when industrial work disappeared men left the labour force to go on sickness benefit for example. This underlines just how important it is to analyse employment, and not just unemployment trends.

6. Conclusions

The analysis of this paper suggests the following broad conclusions:

- (i) Population appears to have had a less than proportionate direct effect on employment, even over the long periods considered here, with capital accumulation being required to

keep employment growing in line with population. Population has little effect on industrial employment and it seems that services have been insufficiently flexible absorb all increases in the non-agricultural population in the long run. The implication is that countries where population growth slowed after 1973 (above all Japan) were at an advantage in maintaining employment rates.

- (ii) Trends in the employment structure are subject to strong “catch-up” effects; a large agricultural reserve sector tended to swell the non-agricultural population and the men concerned tended to find work in the services sector. Low initial employment rates also brought faster subsequent increases in employment throughout the non-agricultural sector as participation rates rose more (for women) or fell less (for men).
- (iii) Capital stock growth had a marked effect on the growth of non-agricultural employment; its impact was much stronger within the industrial sector than for services and this contributed to men’s employment being much more responsive to accumulation than women’s.
- (iv) In comparison to the USA, European employment performance since 1973 has suffered equally from faster decline of industry and slower growth of service jobs. Lack of industrial work has worsened employment prospects and brought economic inactivity for men; lack of service jobs has been associated with a relatively slow rise in women’s participation.
- (v) The implication of (iii) and (iv) is that the weakness of capital accumulation in European industry has played a significant role in its employment problems since 1973.

Notes

1. Maddison assumed that employment grew in line with population of working age for most countries for the period 1870-1913. This is not a good basis from which to estimate the impact of population growth on employment!
2. It is assumed below that the contribution of migration to the population of working age is equal to its (proportionate) effect on the overall population; if immigration comprised more people of working age than did the population on average (around two thirds) then its impact on the labour supply is underestimated by this assumption.
3. Krueger and Pischke (1997) obtain elasticities of 1 or more for various samples of OECD countries for the period 1959-95 but they use actual working age population and do not include a full set of country trends.
4. The ratio of value added per head in agriculture to that of the whole economy in 1960 was 0.35 in Japan, 0.36 in the EEC, 0.45 in the USA and 0.71 in the UK (OECD *Historical Statistics*).
5. The faster growth of women's employment in Sweden after 1950 than in Germany reflected low recorded employment of women in Swedish agriculture so that few women lost jobs with the move off the land.
6. The measure is approximate. Some of those engaged in agriculture will be older than the upper limit (65) for population of working age; some rural women will be engaged in service activities etc.

7. Maddison actually compiled two sets of capital stock data, the first (1982) covering the G7 countries and based on national sources which used different asset lives and the second (1991), omitting Canada and Italy but including Netherlands, based on common assumptions as to asset lives. Some of the 1991 numbers are rather strange (for example rather high capital stock growth in the UK over 1950-73) so the data used here are from Maddison (1982), updated to 1990 from OECD (1994), plus Netherlands from Maddison (1991). Use of the common asset lives data set gives similar, but rather less significant, results than those reported here.

8. Repeating the regression in table 2 for women separately suggests that the employment of women inside agriculture was just as subject to the influence of capital stock growth and the initial size of the agricultural sector as is the employment of men (if anything more so); so while capital accumulation sucked women out of agriculture it did not pull them into urban jobs.

TABLES AND FIGURES

Table 1 Employment and Population 1913-1994

Dep Var Employment growth %pa (No of countries)	Pop of Working Age % pa	"Natural" Pop % pa	Emp/Pop Base year ratio	Const	1913- 1950 dummy	1950- 1973 dummy	Country Dumm- ies	Corr R2 (Obs)
1. All (15)	1.173 (.074) [.000]			-0.002 (.001) [.027]	No	No	No	0.796 (45)
2. All (15)		0.613 (.151) [.000]	-0.025 (.007) [.023]	0.022 (.0081) [.000]	Insig	-.002 (.001) [.029]	Sig [.000]	0.789 (43)
3. Men (15)		1.045 (.197) [.000]	-0.034 (.008) [.000]	0.030 (.008) [.000]	.008 (.001) [.000]	.005 (.001) [.000]	Sig [.000]	0.814 (43)
4. Women (15)		0.342 (.260) [.200]	-0.041 (.010) [.001]	0.032 (.007) [.000]	-.013 (.002) [.000]	Insig	Sig [.000]	0.760 (43)

Standard errors (Huber) in (); p-values in []

Table 2 Agricultural Employment, men 1913-1994

Change in AgEmp/Popwa % pa (No of countries)	Nonag- pop/ Popwa Base year Ratio	Capital Stock Growth % pa	Const	1913- 1950 dummy	1950- 1973 dummy	Country Dumm- ies	Corr R2 (Obs)
1. (8)	0.011 (.006) [.093]	-0.084 (.049) [.111]	-.005 (.003) [.176]	Insig	Insig	Sig [.013]	0.610 (24)

Dependent variable: change in ratio of agricultural employment to population of working age
Standard errors (Huber) in (); p-values in []

Table 3 Capital Stock and Non-Agricultural Employment 1890-1990

Av annual % growth rates	K (mean)	K (range)	Non-ag emp (mean)	Non-ag emp (range)
1890-1913	3.2	1.1 (UK) 5.1 (USA)	1.8	1.0 (It) 2.6 (USA)
1913-50	1.9	0.9 (UK) 3.3 (Ja)	1.3	0.7 (UK) 2.0 (Neths)
1950-73	5.3	3.4 (UK) 9.0 (Jap)	2.1	0.6 (UK) 4.0 (Jap)
1973-90	3.7	2.6 (UK) 7.1 (Jap)	1.2	0.5 (Ge,UK) 2.6 (Can)

Table 4 Non-Agricultural Employment and Capital Stock

Non-Agricultural Employment % pa	Natural Pop of Working Age % pa	Capital Stock (K) %pa	Nonag-popsh Initial year Ratio	Emp/Pop Nonag Initial year ratio	Const	Period Dummies	Country Dummy	R2 Corr (N)
1. Total	0.663 (.220) [.013]	0.235 (.066) [.006]	-.024 (.009) [.032]	-.054 (.010) [.000]	.053 (.015) [.004]	Insig	Sig? [.071]	0.856 (24)
2. Women	0.819 (.335) [.035]	0.138 (.130) [.313]	-0.011 (.016) [.506]	-0.064 (.014) [.001]	0.045 (.022) [.071]	-0.017 (.006) Insig	Sig [.044]	0.739 (24)
3. Men	0.828 (.208) [.003]	0.226 (.060) [.004]	-.022 (.073) [.013]	-0.044 (.006) [.000]	0.047 (.011) [.002]	0.011 (.002) .005 (.002)	Sig? [.076]	0.921 (24)

Standard errors (Huber) in (); p-values in []

Table 5 Industry and Services, Capital and Employment

Employment By sector % pa	Natural Pop of Working Age % pa	Nonag- popsh Initial year ratio	Emp/Pop Nonag Initial year Ratio	Aggregate Capital Stock (K) %pa	Const	Period Dummies 1913-50 1950-73	Country Dummy	R2 Corr (N)
(1) Industry Total	0.273 (.321) [.415]	-0.006 (.011) [.614]	-0.051 (.012) [.001]	0.362 (.099) [.004]	0.014 (.016) [.395]	0.024 (.004) 0.011 (.004)	Insig	0.840
(2) Women	0.316 (.381) [.426]	0.022 (.0180) [.255]	-0.063 (.014) [.001]	0.608 (.167) [.005]	-0.027 (.019) [.207]	0.026 (.006) 0.011 (.005)	Sig [.015]	0.825
(3) Men	0.570 (.367) [.152]	-0.010 (.010) [.360]	-0.038 (.011) [.005]	0.214 (.096) [.050]	0.020 (.017) [.259]	0.025 (.003) 0.015 (.003)	Insig	0.866
(4) Services Total	0.869 (.234) [.004]	-0.027 (.010) [.017]	-0.049 (.009) [.000]	0.171 (.056) [.013]	.063 (.016) [.002]	-0.010 (.003) -0.005 (.002)	Sig [.022]	0.818
(5) Women	0.907 (.353) [.028]	-0.011 (.016) [.493]	-0.046 (.016) [.017]	-0.074 (.123) [.559]	0.051 (.024) [.060]	-0.020 (.006) Insig	Insig	0.612
(6) Men	1.066 (.170) [.000]	-0.030 (.007) [.001]	-0.044 (.005) [.000]	0.262 (.052) [.001]	0.061 (.009) [.000]	Insig	Sig [.002]	0.895

Standard errors (Huber) in (); p-values in []

Table 6 Employment and Capital Stock – Disaggregated Results 1970-90

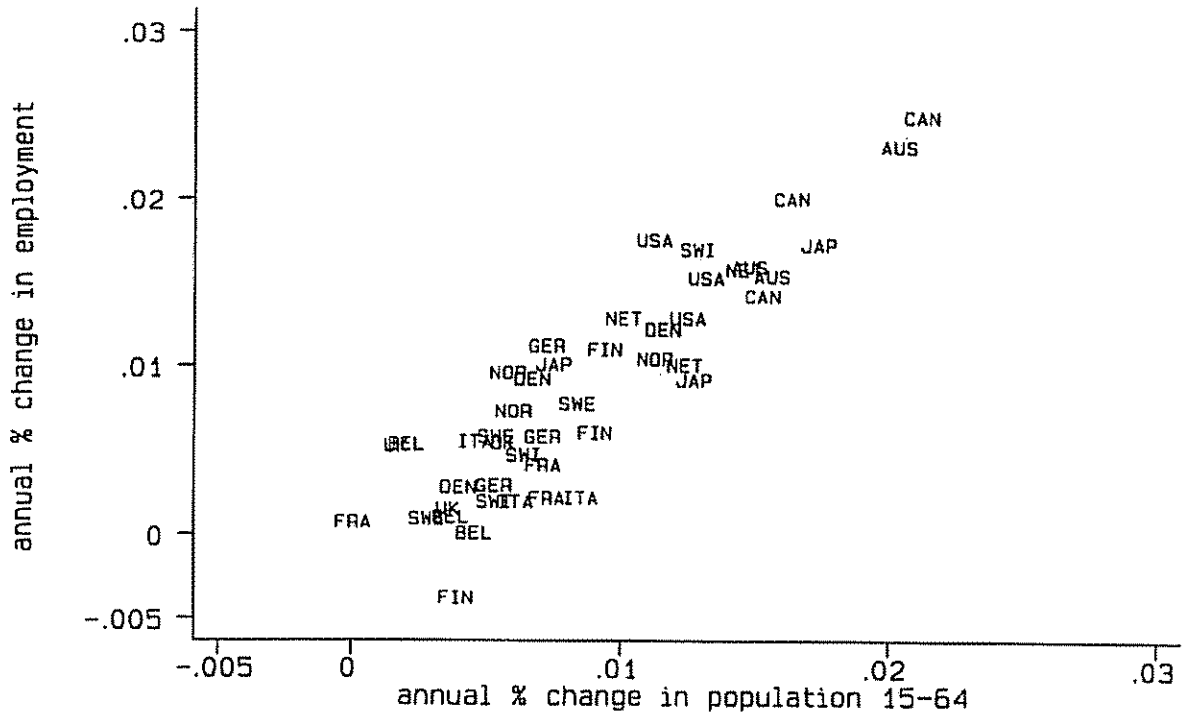
	Own Capital Stock % pa	Manuf- act K	Industry dummies	Country dummies	Corr R2	Obs periods
(1) Indust Emp	0.223 (.053) [.000]		Sig [.000]	Sig [.000]	0.534	241 2
(2) Service Emp	0.110 (.088) [.214]	0.397 (.203) [.054]	Sig [.000]	Sig [.000]	0.704	138 2

Standard errors (Huber) in (); p-values in []

Table 7 Employment Trends Europe and USA 1950-73

All Workers	Europe 1950-73	Europe 1973-94	Change	USA 1973-94	Europe - USA 73-94
average % pa changes					
Population of Working Age	0.57	0.54	-0.03	1.14	-0.60
Effect of Agricultural Decline	0.66	0.21	-0.45	0.06	0.15
Non- Ag Population	1.23	0.75	-0.48	1.20	-0.45
Non-Ag Employment	1.33	0.57	-0.77	1.79	-1.22
average annual change in % points					
Non-Ag Emp/Non-ag Pop	0.07	-0.10	-0.17	0.40	-0.51
Industrial Emp/ Non-ag Pop	-0.12	-0.46	-0.34	-0.19	-0.27
Services Emp/Non-ag Pop	0.19	0.34	0.15	0.60	-0.25
Inactivity/ Non-ag Pop	0.02	-0.13	-0.15	-0.47	0.34
Unemployment/ Non-ag Pop	-0.09	0.24	0.33	0.06	0.18
Men					
average % pa changes					
Non-Ag Employment	1.06	0.03	-1.04	1.15	-1.13
average annual change in % points					
Non-Ag Emp/Non-ag Pop	-0.30	-0.62	-0.33	-0.07	-0.55
Industrial Emp/ Non-ag Pop	-0.31	-0.73	-0.41	-0.36	-0.37
Services Emp/Non-ag Pop	0.02	0.09	0.07	0.28	-0.19
Inactivity/ Non-ag Pop	0.38	0.36	-0.02	0.01	0.35
Unemployment/ Non-ag Pop	-0.08	0.26	0.34	0.06	0.20
Women					
average % pa changes					
Non-Ag Employment	1.89	1.44	-0.45	2.66	-1.23
average annual change in % points					
Non-Ag Emp/Non-ag Pop	0.33	0.37	0.04	0.86	-0.49
Industrial Emp/ Non-ag Pop	0.01	-0.22	-0.22	-0.05	-0.17
Services Emp/Non-ag Pop	0.33	0.59	0.26	0.90	-0.31
Inactivity/ Non-ag Pop	-0.24	-0.59	-0.35	-0.94	0.34
Unemployment/ Non-ag Pop	-0.10	0.22	0.32	0.07	0.15

Fig 1 Employment and Population 1913-50 50-73 73-94



Employment and Natural Population 1913-50 50-73 73-94

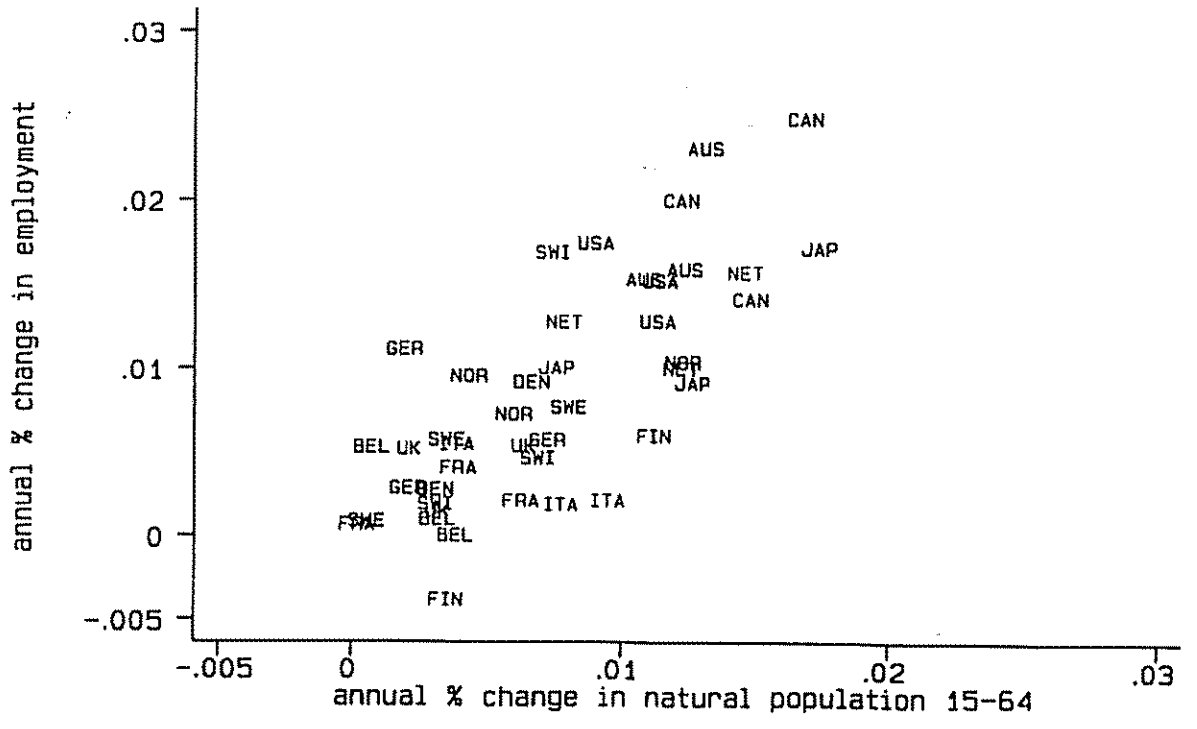
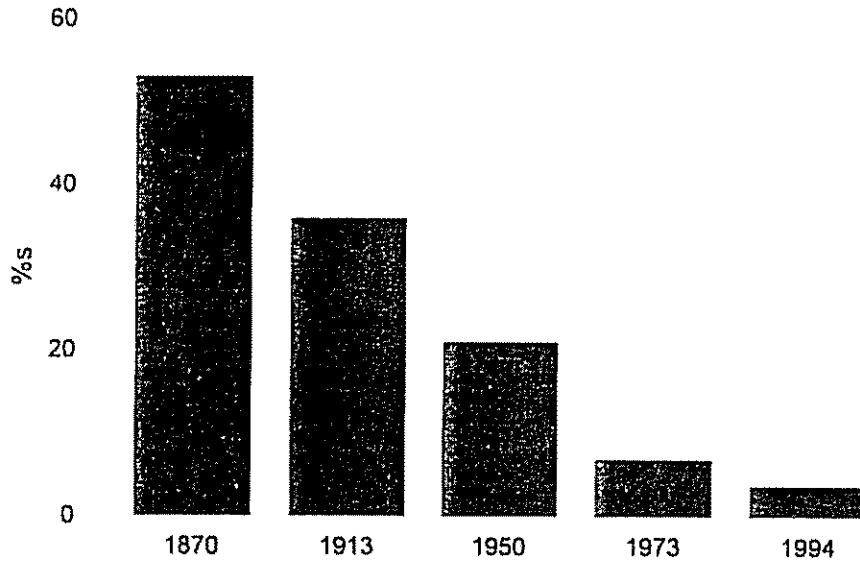


Figure 2 Agricultural Population
% of Population, 15-64



Contributions to Non-Agricultural Population Growth

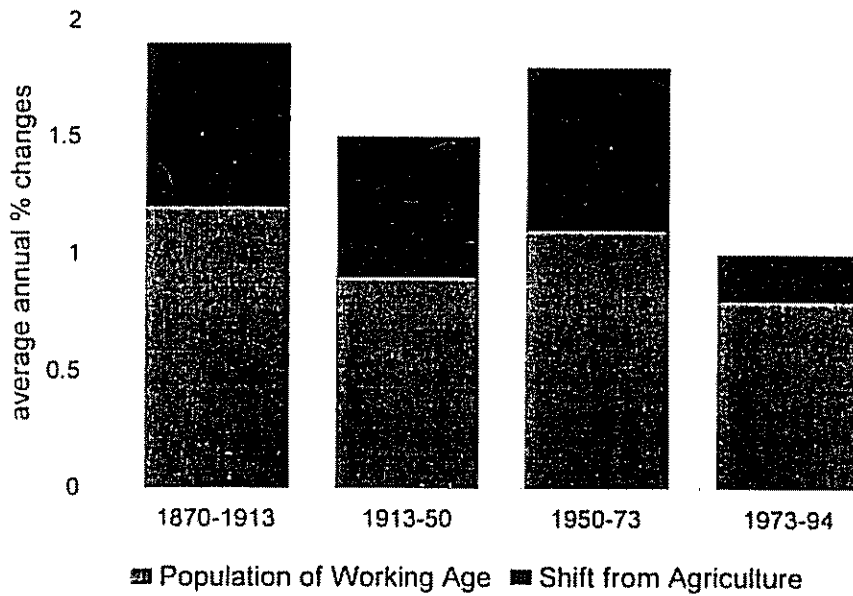


Figure 3 Non-Agricultural Employment
% of Non-Agricultural Population, 15-64

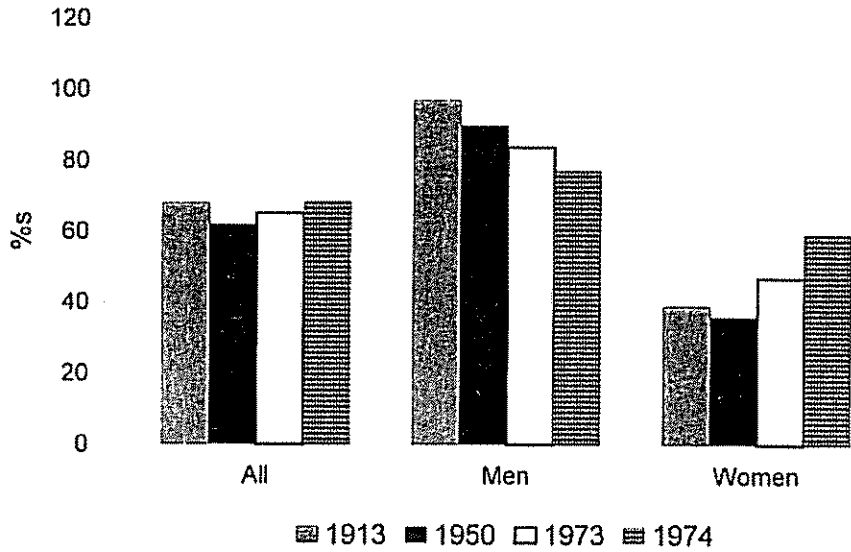


Fig 4 Non-Agricultural Employment and Capital 1890-1994

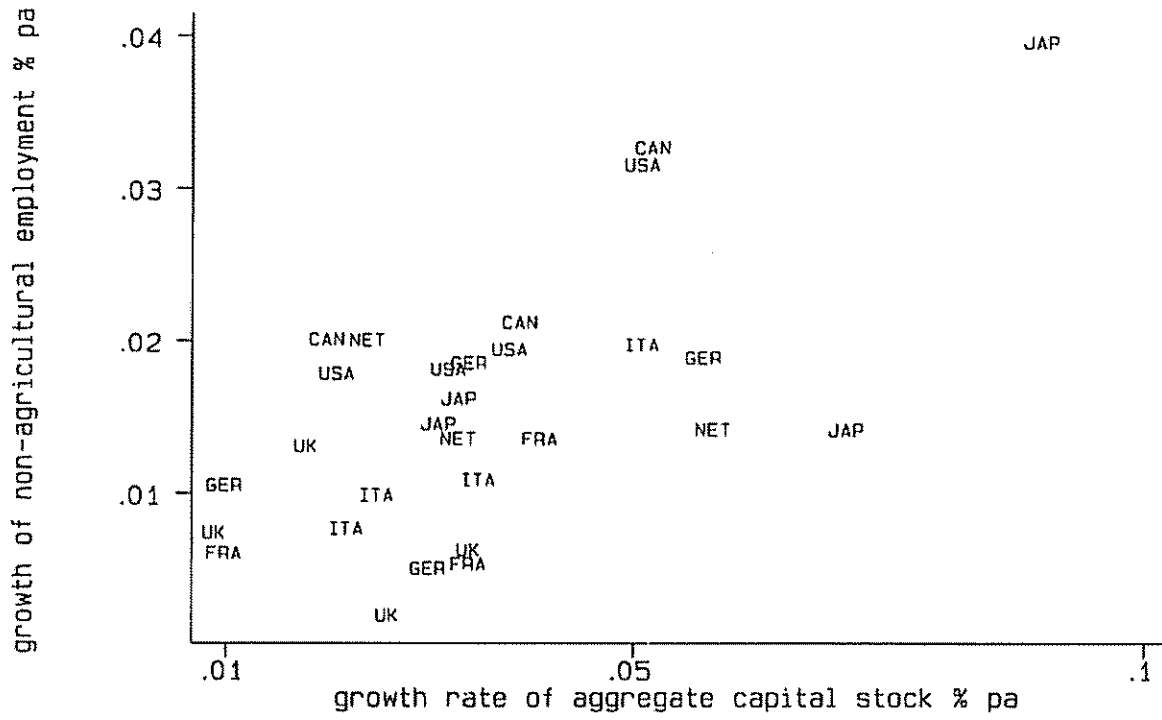


Figure 5 Industrial Employment
% of Non-Agricultural Population, 15-64

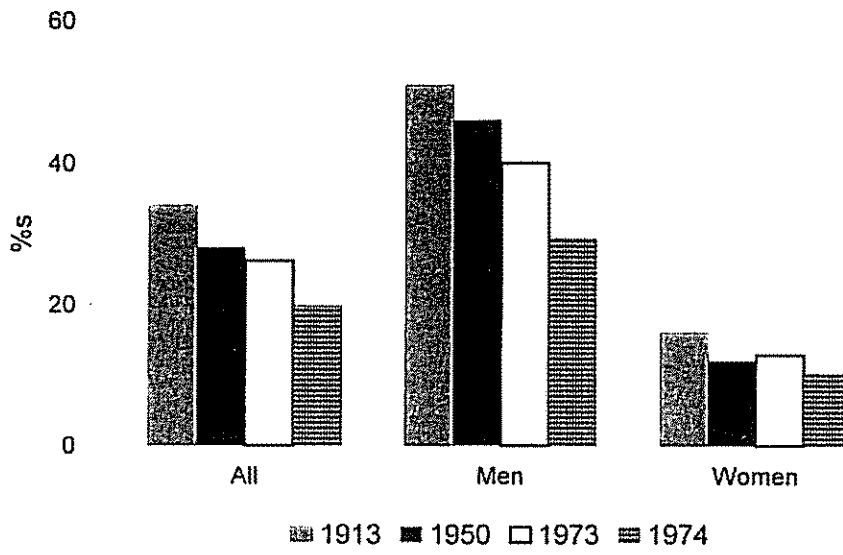


Figure 6 Services Employment
% of Non-Agricultural Population, 15-64

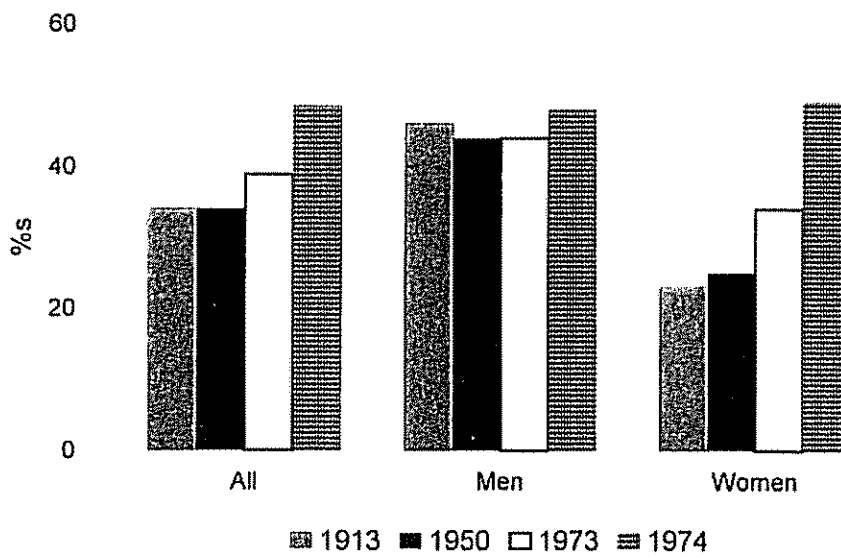


Figure 7 Agricultural and Non-Agricultural Employment, 1950-73



Figure 8 Industrial and Services Employment, 1973-94

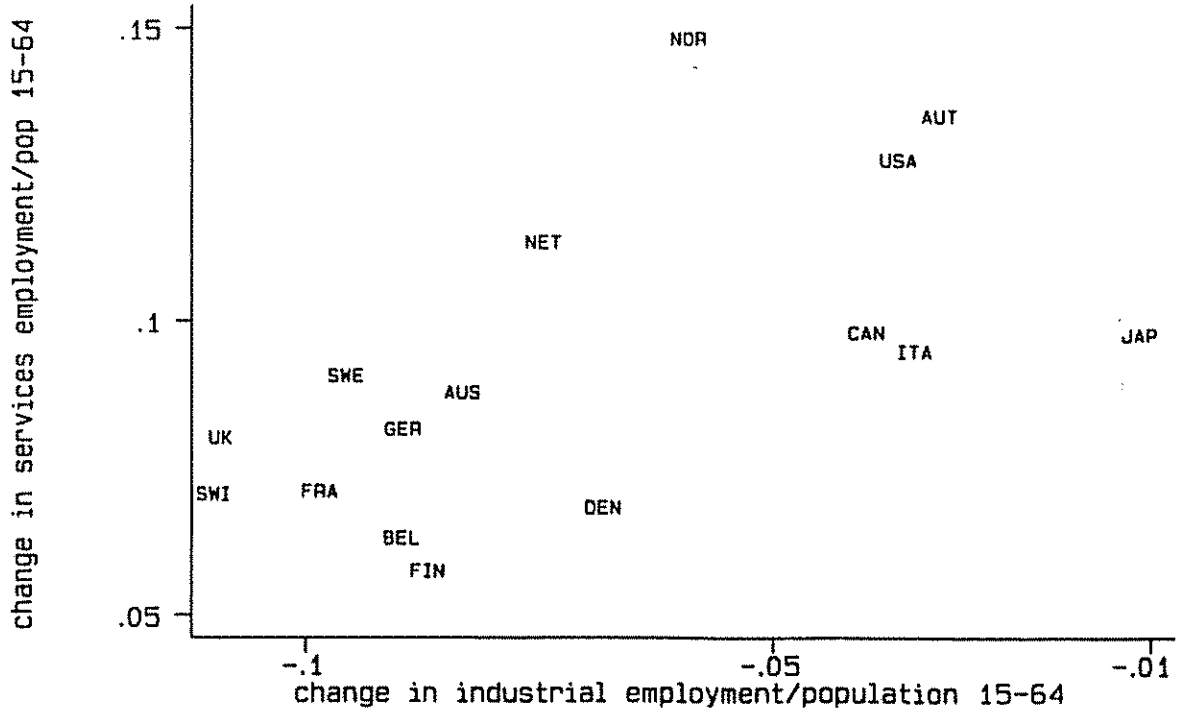
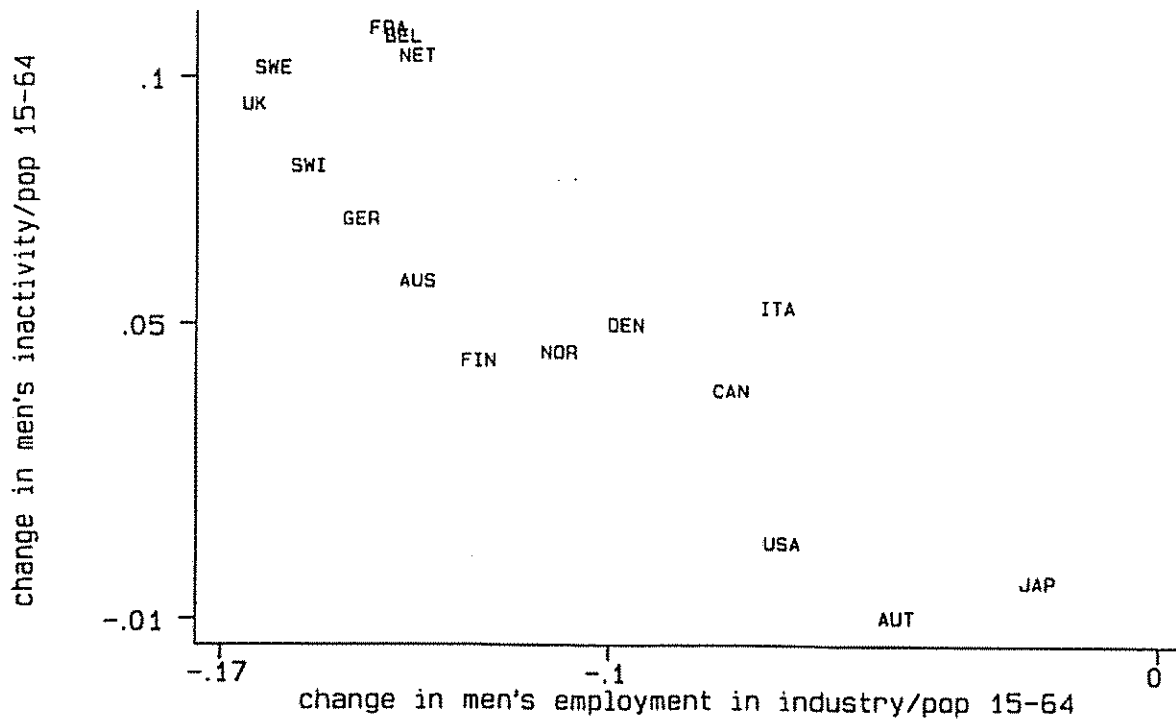


Fig 9 Women's Inactivity and Employment in Services 1973-94



Fig 10 Men's Inactivity and Employment in Industry 1973-94



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APPENDIX

Data Appendix

Main data sources:

Maddison(1991) and Bairoch(1968) for 1870-1950 figures. These were supplemented by Maddison(1995) for 1913 for the major countries.

All figures for 1973 and 1994 are from the *OECD Labour Force Statistics* unless specified.

Population of working age and labour force by gender for 1950 are from the *OECD Manpower Statistics* using 1950 or the first year for which the breakdown was given, except for Germany and Japan where the figures were taken from the ILO. These were then applied to the total figure provided in Maddison(1991). The female proportion of the population of working age before 1950 was assumed to be 50% of the total.

Employment by Sector:

1870-1950

Denmark, Switzerland, Japan: No breakdown between industry and services was provided for 1870 in Maddison(1991). For agriculture in Japan the 1920 proportions provided in Bairoch(1968) were used to estimate the gender breakdown in 1870 and 1913.

Maddison(1991) did not have 1913 figures. These were taken from Maddison(1995) Table 2-5 for the USA, France, Germany, Netherlands, UK, Japan. For Finland an interpolation between the 1870 and 1950 figures was made. In the rest of the cases the numbers for 1913 were taken from the closest census results reported in Bairoch (1968).

The 1950 figures are from Maddison(1991) except for the USA, France, Germany, Netherlands, UK, Japan which were taken from Maddison(1995) Table 2-5.

For 1870-1950 the gender breakdown of sectors is based on the proportions from the closest census results reported in Bairoch(1968). Obviously these estimates are very rough. For the US for both 1870 and 1913 the gender breakdown in agriculture is taken from US Historical Statistics because none was available from Bairoch(1968). For industry and services a crude breakdown for 1913 could be calculated based on the 1950 breakdown in Bairoch and the change in the gender breakdown of manual workers and {service + clerical + sales} workers from 1910 to 1950 as provided by the *Historical Statistics*.

1973-94

A number of specific country adjustments were made to the *OECD Labour Force Statistics* data for 1973 and 1994 where breaks in the series have been identified.

Appendix Table 1
Population of Working Age
 average % per annum growth rates

	1870-1913	1913-1950	1950-73	1973-94
Austria	1.0	0.2	0.0	0.7
Belgium	1.1	0.5	0.2	0.4
Denmark	1.0	1.2	0.7	0.4
Finland	1.2	0.9	0.9	0.4
France	0.2	0.0	0.7	0.7
Germany	1.2	0.7	0.7	0.5
Italy	0.6	0.9	0.6	0.5
Netherlands	1.2	1.5	1.3	1.0
Norway	0.8	1.1	0.6	0.6
Sweden	0.7	0.8	0.5	0.3
Switzerland	0.9	0.6	1.3	0.6
UK	1.1	0.6	0.2	0.4
Canada	2.0	1.5	2.1	1.7
Australia	2.9	1.5	2.1	1.6
Japan	0.9	1.3	1.8	0.8
USA	2.3	1.3	1.3	1.1
Europe	0.8	0.6	0.6	0.5
All	1.2	0.9	1.1	0.8

Appendix Table 2
Contribution of Migration to Population Growth
 average % per annum growth rates

	1870--1913	1914-49	1950--73	1974-94
Austria			0.1	0.2
Belgium	0.1	0.1	0.1	0.1
Denmark			0.0	0.1
Finland			-0.2	0.0
France	0.1	-0.0	0.3	0.1
Germany	-0.2	-0.0	0.5	0.3
Italy	-0.3	-0.1	-0.2	0.1
Netherlands	-0.1	-0.0	0.0	0.2
Norway	-0.6	-0.1	0.0	0.1
Sweden	-0.4	0.0	0.2	0.2
Switzerland	0.0	-0.1	0.5	0.2
UK	-0.4	-0.1	-0.0	0.0
Canada	0.3	0.1	0.4	0.4
Australia	0.5	0.3	0.7	0.5
Japan		0.0	-0.0	-0.0
USA	0.5	0.1	0.2	0.2
Europe	-0.2	-0.0	0.2	0.2
All	0.0	0.0	0.2	0.2

*) calculated as annual average net migration as % of average population

Appendix Table 3
Nonagricultural Population as a Share of Population
of Working Age (%)

	1870	1913	1950	1973	1994
Austria	46	60	78	90.9	94.8
Belgium	62	77	90	96.3	98.0
Denmark	30	53	72	91.2	94.5
Finland	51	48	58	85.3	93.5
France	54	64	77	90.0	96.1
Germany	36	75	87	95.4	97.9
Italy	61	41	58	86.9	94.4
Netherlands	32	73	86	94.5	96.3
Norway	42	53	63	89.4	94.3
Sweden	70	47	73	91.9	96.4
Switzerland	35	68	78	91.1	94.3
UK	61	85	94	96.7	97.9
Canada	30	55	75	93.3	96.1
Australia	42	70	82	91.9	95.2
Japan	52	44	65	90.6	95.4
USA	47	69	85	95.6	96.8
Europe	64	67	79	92.4	96.5
All	47	64	79	93.2	96.4

Appendix Table 4
Non-Agricultural Population of Working Age
average % per annum growth rates

	1870-1913	1913-50	1950-73	1973-94
Austria	1.6	0.9	0.7	0.9
Belgium	1.6	0.9	0.5	0.5
Denmark	2.3	2.0	1.7	0.6
Finland	0.7	1.5	2.6	0.8
France	2.0	0.5	1.4	1.0
Germany	0.9	1.1	1.1	0.7
Italy	1.6	1.8	2.4	1.0
Netherlands	2.0	1.9	1.7	1.1
Norway	1.0	1.6	2.1	0.8
Sweden	1.5	2.0	1.6	0.5
Switzerland	3.1	1.1	2.0	0.7
UK	3.2	0.8	0.3	0.4
Canada	1.8	2.4	3.1	1.8
Australia	3.5	1.9	2.6	1.8
Japan	1.4	2.4	3.3	1.0
USA	1.9	1.8	1.8	1.2
Europe	1.1	1.1	1.2	0.7
All	1.9	1.5	1.8	1.0

Appendix Table 5
 Nonagricultural Employment as a Share of Nonagricultural Population of Working Age (%)
 All workers

	1870	1913	1950	1973	1994	1870	1913	1950	1973	1994	1870	1913	1950	1973	1994
Men															
Austria	56	52	59	59.3	67.6	Austria	71	90	77.4	77.2	Austria	33	34	42.7	57.9
Belgium	63	68	57	60.5	56.6	Belgium	92	86	80.7	66.7	Belgium	44	28	40.4	46.5
Denmark	85	78	74	75.8	73.1	Denmark	96	95	88.3	77.5	Denmark	60	54	63.3	68.6
Finland	70	65	72	68.3	59.0	Finland	91	91	75.9	59.4	Finland	46	55	61.0	58.7
France	63	65	66	65.2	58.2	France	83	90	81.8	65.2	France	47	44	48.4	51.1
Germany	83	85	56	66.7	64.1	Germany	92	87	87.6	74.1	Germany	25	31	46.7	53.7
Italy	64	64	57	52.1	54.2	Italy	119	90	78.5	71.2	Italy	50	28	27.1	37.4
Netherlands	103	79	65	59.4	63.6	Netherlands	94	99	83.8	73.4	Netherlands	34	31	34.6	53.4
Norway	83	87	73	67.1	73.0	Norway	94	104	83.9	76.1	Norway	64	43	50.0	69.9
Sweden	79	83	81	74.4	70.3	Sweden	122	112	84.9	69.9	Sweden	52	50	63.5	70.8
Switzerland	83	83	76	78.8	71.9	Switzerland	103	108	100.7	87.8	Switzerland	64	49	56.3	55.9
UK	79	70	67	71.8	67.9	UK	95	93	90.4	73.8	UK	46	43	53.5	61.9
Canada	82	71	61	63.2	67.4	Canada	113	88	80.7	72.7	Canada	29	32	45.7	61.9
Australia	79	68	67	69.1	67.1	Australia	102	96	89.2	76.0	Australia	34	37	48.3	58.1
Japan	89	76	57	67.7	73.3	Japan	111	85	87.8	87.4	Japan	41	32	48.4	59.1
USA	75	65	64	64.9	73.4	USA	97	90	81.2	79.7	USA	34	38	49.1	67.2
Europe	75	68	63	64.2	61.8	Europe	94	91	84.3	71.2	Europe	41	37	44.4	52.2
All	77	68	62	65.1	68.3	All	97	90	83.9	77.2	All	39	36	46.9	59.3

Appendix Table 6
Non-Agricultural Employment

	All workers			Men			Women					
	average % per annum growth rate 1870-1913	1913-1950	1950-73	1973-94	average % per annum growth rate 1870-1913	1913-1950	1950-73	1973-94	average % per annum growth rate 1870-1913	1913-1950	1950-73	1973-94
Austria	1.4	1.2	0.8	1.5	Austria	1.2	0.4	1.1	Austria	1.3	1.4	2.1
Belgium	1.8	0.4	0.8	0.2	Belgium	0.7	0.3	-0.4	Belgium	-0.3	2.1	1.2
Denmark	1.8	1.9	1.8	0.4	Denmark	1.9	1.5	-0.0	Denmark	1.8	2.3	0.9
Finland	1.8	1.6	2.4	0.1	Finland	1.3	2.0	-0.2	Finland	2.1	2.9	0.5
France	0.5	0.6	1.3	0.5	France	0.6	1.2	-0.1	France	0.4	1.6	1.4
Germany	1.8	1.0	1.9	0.5	Germany	0.7	1.5	0.0	Germany	1.9	2.6	1.1
Italy	1.0	0.7	2.0	1.2	Italy	0.9	1.9	0.6	Italy	0.4	2.1	2.6
Netherlands	1.6	2.0	1.3	1.4	Netherlands	2.1	1.0	0.5	Netherlands	1.8	2.0	3.5
Norway	1.4	1.4	1.7	1.2	Norway	1.9	1.3	0.4	Norway	0.6	2.7	2.4
Sweden	1.1	1.8	1.2	0.2	Sweden	1.8	0.4	-0.4	Sweden	1.9	2.6	1.0
Switzerland	1.3	0.8	2.1	0.3	Switzerland	1.0	2.0	-0.0	Switzerland	0.5	2.3	0.8
UK	1.3	0.7	0.6	0.2	UK	0.7	0.3	-0.5	UK	0.7	1.2	1.1
Canada	2.7	2.0	3.3	2.1	Canada	1.8	2.6	1.3	Canada	2.7	4.8	3.3
Australia	2.8	1.9	2.7	1.6	Australia	1.8	2.2	0.9	Australia	2.1	3.8	2.7
Japan	1.4	1.6	4.0	1.4	Japan	1.5	3.5	1.1	Japan	1.8	5.1	1.8
USA	3.2	1.8	1.9	1.8	USA	1.6	1.4	1.2	USA	2.1	3.0	2.7
Europe	1.1	0.9	1.3	0.6	Europe	0.8	1.1	0.0	Europe	0.9	1.9	1.4
All	1.6	1.3	2.0	1.2	All	1.2	1.6	0.7	All	1.4	2.9	2.1

Appendix Table 7
Industrial Employment as a Share of Monocultural Population of Working Age (%)
All Workers

	1870	1913	1950	1973	1994	1870	1913	1950	1973	1994	1870	1913	1950	1973	1994
Men											Women				
Austria	31	29	32	28.8	24.2	Austria	44	55	44.0	37.0	Austria	14	13	14.7	11.0
Belgium	42	40	29	25.4	15.8	Belgium	60	48	40.1	25.4	Belgium	20	11	10.7	6.0
Denmark	32	32	33	28.5	20.3	Denmark	50	52	41.1	29.5	Denmark	14	14	15.7	10.8
Finland	40	34	37	28.8	17.0	Finland	51	55	41.8	24.7	Finland	17	21	16.3	9.0
France	38	36	32	28.2	16.2	France	46	49	41.8	24.6	France	26	17	14.3	7.7
Germany	36	37	31	33.5	23.5	Germany	60	55	50.5	34.4	Germany	13	12	17.1	12.1
Italy	50	51	30	24.1	18.5	Italy	70	50	38.8	28.3	Italy	32	13	10.2	8.8
Netherlands	30	29	30	23.3	15.1	Netherlands	51	54	39.3	24.5	Netherlands	8	7	6.9	5.2
Norway	44	34	35	25.3	17.7	Norway	51	58	41.3	27.7	Norway	17	12	8.9	7.4
Sweden	38	41	41	29.5	18.2	Sweden	70	69	46.6	27.8	Sweden	12	14	11.9	8.2
Switzerland	41	52	42	38.3	25.3	Switzerland	70	68	57.8	39.6	Switzerland	35	19	18.1	10.9
UK	43	35	32	30.8	19.3	UK	52	49	46.9	29.5	UK	18	15	15.0	9.0
Canada	49	33	28	20.5	15.8	Canada	58	47	33.2	24.2	Canada	8	9	7.8	7.2
Australia	37	30	29	26.1	16.5	Australia	51	46	41.3	25.8	Australia	10	11	10.4	7.0
Japan	39	33	25	29.1	26.5	Japan	47	40	41.0	36.6	Japan	19	11	17.7	16.3
USA	37	27	25	22.0	17.9	USA	44	40	34.3	26.9	USA	9	9	10.1	9.1
Europe	41	37	32	28.9	19.2	Europe	55	52	44.4	29.1	Europe	20	14	13.7	9.1
All	40	34	28	26.2	19.8	All	51	46	39.9	29.4	All	16	12	12.9	10.3

Appendix Table 8
Service Employment as a Share of Nonagricultural Population of Working Age (%)
All Workers

	1870	1913	1950	1973	1994	Men	1870	1913	1950	1973	1994	Women	1870	1913	1950	1973	1994
Austria	25	23	27	30.6	43.5	Austria	27	35	33.4	40.2	Austria	18	22	28.0	46.9		
Belgium	21	28	27	35.1	40.9	Belgium	32	38	40.5	41.2	Belgium	24	17	29.7	40.5		
Denmark	46	45	41	47.4	52.9	Denmark	46	43	47.1	48.0	Denmark	45	40	47.5	57.8		
Finland	32	35	35	39.5	42.1	Finland	40	36	34.1	34.7	Finland	29	34	44.7	49.7		
France	27	29	34	37.1	42.0	France	37	41	40.0	40.6	France	21	27	34.1	43.4		
Germany	27	22	25	33.2	40.6	Germany	31	33	37.0	39.7	Germany	12	19	29.6	41.6		
Italy	33	34	27	28.0	35.7	Italy	50	40	39.6	42.9	Italy	18	16	16.9	28.6		
Netherlands	35	34	34	37.5	48.5	Netherlands	43	45	47.2	48.8	Netherlands	26	24	27.6	48.2		
Norway	59	45	39	41.9	55.3	Norway	43	46	42.6	48.4	Norway	47	32	41.1	62.5		
Sweden	45	45	39	44.9	52.1	Sweden	51	43	38.3	42.0	Sweden	39	36	51.7	62.6		
Switzerland	45	31	34	40.6	46.6	Switzerland	33	37	42.8	48.2	Switzerland	30	30	38.3	45.0		
UK	36	35	35	41.0	48.6	UK	43	44	43.5	44.3	UK	28	28	38.5	52.9		
Canada	33	38	33	42.7	51.6	Canada	55	42	47.5	48.5	Canada	21	23	37.9	54.7		
Australia	42	38	39	43.0	50.6	Australia	51	50	47.9	50.2	Australia	24	26	37.9	51.1		
Japan	50	43	32	38.6	46.8	Japan	64	45	46.8	50.8	Japan	21	21	30.7	42.8		
USA	38	39	39	42.9	55.4	USA	52	50	46.9	52.8	USA	25	29	39.1	58.1		
Europe	32	30	31	35.4	42.6	Europe	39	40	40.1	42.1	Europe	21	23	30.7	43.1		
All	35	34	34	38.9	48.5	All	46	44	44.0	47.9	All	23	25	34.0	49.1		

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