

Demand for Women and Workplace Organisation

Changes. The Role of the Demand for Skills.

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Abstract

The employment and wages of women have risen both in absolute terms and relative to men in the UK, suggesting a demand shift which favoured women. It has been argued that within industry demand shifts that favour white collar workers are induced by technical change. Given the traditional dominance of men in blue collar jobs, technical change might be expected to favour women relative to men. We suggest that technical change and the associated organisational change that occurred in the workplace in the last fifteen years may be behind the increased demand for female workers. We argue that organisational change at work has promoted the need for social, communication and interpersonal skills, which are more female intensive.

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1 Introduction

In this paper we investigate the impact of technical and organisational change on specific aspects of the labour market with particular emphasis on the demand for women relative to men. We argue that technological and the subsequent organisational change may have altered the structure of the labour market. In addition it may have favoured female workers relative to men. This would be an explanation for the improved position of women in the last two decades. Women, in several developed countries, have unambiguously seen their employment rates rising at the same time that their wages relative to men also increased. This is taking place during a period of higher participation rates of women and also increased supply of skilled workers. For their employment and wages to continue to rise, an outward shift in the demand for women must have taken place.

Our hypothesis is mainly based on the literature about technical and change which claim that technical progress has favoured the skilled workers. In addition the organisational change literature stresses the importance of certain skills which are particularly important in the new economy. These have to do with communication with colleagues and customers, organising and supervision activities. In other words, the new economy has promoted interpersonal skills and has induced an increased demand for them. Women

are thought to have some of the characteristics highly demanded under the new organisation of work. We wonder if it can be that technological change and the accompanied organisational change have favoured females.

In this paper first we analyse the position of women in the UK labour market in the last 25 years. Then we estimate returns to skills related to technical and organisational change. To examine our hypothesis, we identify those skills which are likely to be female intensive and then we estimate the relative importance of these skills in different sectors of the economy. Our argument is that women must have seen their position improving significantly in those sectors and thus relate the increased relative demand for female workers with technical and organisational change.

For this purpose we use three different datasets. First the New Earnings Panel Dataset, second the National Child Development study, and third we use a cross-section skills survey (1997).

2 Historical Prevalence, Related literature and alternative explanations

2.1 The position of women

It has been documented by many researchers that there has been a significant improvement in the position of women in the labour market in several developed countries. Literature review that the position of women in the labour market relative to men has improved significantly in the last 20 years, in many developed countries. P. Gregg and J. Wadsworth (1999)¹ document that over the last twenty years men's employment rates have fallen while women's have risen. The gender gap in employment rates fell from almost 33% to 12% in 23 years. The gender wage gap is also narrowing². F. Blau and L. Kahn (2000)³ report very similar trends for the US. In particular their evidence shows that the gender earnings ratio began to rise in the late 1970's or early 1980's in the US. Between 1978 and 1999 the weekly earnings of full time women increased from 61% to 76.5% of men's earnings.

¹Gregg, P., and J.Wadsworth (1999): "The State of Working Britain", edited by Manchester Univesrity Press, 1999.

²In 1998, on average women earn 75% of the average male hourly wage compared to only 62% in 1974, in full time jobs.

³Blau, F., and L. Kahn (2000): "Gender Differences in Pay", NBER WP7732, June 2000.

2.2 Technical Change Literature

Skilled biased technological change (SBTC) has been offered as one of the main explanations for the widening wage distribution both in the US and the UK. SBTC associated with the computer revolution would arguably favour the more skilled workers. There is a vast literature which analyses the impact of technological change on the structure of the labour market. Some studies use individual level datasets and estimate simple wage equations, considering the increased use of personal computers at work as clear evidence of the impact of TC on the labour market. They presume that the use of advanced technologies such as computers should lead to increased productivity of the workers working with them. A great part of the critique on the use of computers as indicators of TC is based on the causality issue and possible bias which arises due to unobserved ability and heterogeneity.

Krueger (1993) was the first to examine the impact of technological change on wages as expressed by the impact of computer use on the structure of wages. Using CPS data from 1984 and 1989, he finds a significant cross-section computer premium of between 10% and 15%. Entorf and Kra-marz (1994, 1997) examine the role of unmeasured ability and unobserved heterogeneity in the estimation of the computer wage premium. DiNardo and Pischke (1997) examine the causal relationship between the use of com-

puters and the increased wages. They argue that the best way to control for selection would be to use a panel and estimate wage increases for workers who start using computers at some point, for the first time.

There is another stream of the TC literature that uses industry level data⁴. The first evidence that SBTC may be true comes from studies⁵ which use shift share analysis to decompose the changes in wage bill and employment share into between and within industry components. In their majority, they find that the greatest part of the changes come from the within component, that is changes have mainly taken place within establishment, workplaces and industries. Moreover if SBTC is a valid hypothesis then one should expect to find that skill demand has risen faster in industries and workplaces that spend more money on R&D, produce more innovations and use more computers. The usual estimation procedure consists of cost share equations which relate changes in the skilled wage bill /employment share in an industry to observable measures of technology⁶.

⁴Autor, A., L. Katz and A. Krueger (1998), Berman, E., J. Bound and Z. Griliches (1994), Berman, E., J. Bound and S. Machin (1998), Berman, E., and S. Machin (2002), Machin, S. and J. Van Reenen (1998).

⁵Autor, Katz and Krueger (1998), and Berman, Bound and Machin (1998).

⁶Autor, Katz and Krueger (1998), Berman, Bound and Machin (1998) and Machin and Van Reenen (1998) find that for a range of time periods, different levels of aggregation and different technology measures there exists a positive association between industry shifts in skilled wage bill/employment shares and observable technology measures.

2.3 Organisational Change Literature

Furthermore there is a recent literature dealing with the possibility of significant organisational changes (OC) being behind the important changes in the labour market. According to that view, high skills are complements not only with technology but also with organisational change. It is not only cognitive skills which are highly rewarded but also 'team' skills or the so-called 'people' skills which include skills required to deal with clients, subordinates, managers and colleagues. These skills seem to complement those acquired in higher education and are, at the same time, combined with technology use.

Bresnahan (1999) attempts to provide a new theory of workplace computerization. According to Bresnahan, there is an apparent complementarity not only between computers and high skills but also between computers, organisational change and new products. In aggregate, organisational computing affects the skill composition of clerical work in the following way: it induces reduced demand for cognitive skills and increased demand for so-called 'people' skills. These are interactive skills necessary to deal with clients and the internal organisation of work.

Information technology and co-inventions are responsible for changes in the mix of skills demanded by the enterprises and also complement work

that requires certain cognitive and social skills. According to Bresnahan, Brynjofsson and Hitt (1999), there is a four-way complementary system which consists of: information technology (IT), new work organisation rules, new levels of service quality (and/or new products) and highly skilled labour. They find that IT use is correlated with a new workplace organisation that includes broader responsibilities for line workers, more decentralised decision making and more self-managing teams⁷.

Finally, Caroli and Van Reenen (1999) define skill biased organisational change (SBOC) as the simultaneous emergence of the three following situations: decentralization of authority, delayering of managerial functions and increased multi-tasking. The main hypothesis they test is the existence of a complementary relationship between technological change (TC), organisational change (OC) and skills.

2.4 Alternative Explanations

Several other explanations for the improved position of women have been given. Some of them are related to reduced discrimination against women and others to governmental policies. For the UK, P. Gregg and J. Wadsworth

⁷In addition there are strong complementarities between IT, skills and new organisational forms. Successful computerisation requires re-organisation and re-consideration of the type of workers needed.

(1999) suggest the Equal Pay Act (of 1970 and then that of 1983). In addition researchers argue that women not only have caught up men at their education levels, but also have surpassed them. In mid 1970's women were less qualified than men. By mid 1990's the educational attainment of women in work had improved relative to men.

3 Empirical Analysis - Research Design

3.1 The Data

The empirical analysis crucially depends on the availability of the data. At the moment we focus on the UK first because of the number of rich datasets at individual and industry level and second because the expansion of the service sector has been very important in this country. The data we use for this paper come from two⁸ different sources: first the New Earnings Survey Panel Dataset (NESPD) and the Skills Survey 1997 (SS) conducted by the DfEE.

⁸In the big version of the paper where we also estimate returns to specific skills, we use a third source of data. This is the National Child Development study (NCDS).

3.1.1 New Earning Survey Panel Dataset

The New Earnings Survey Panel Data-set (NESPD) is a survey of the earnings of employees in Great Britain, carried out in April of each year by the Office of National Statistics. It starts in 1975 and continues until today, with the last wave being that of 1999⁹. The main purpose of this survey is to obtain annual information about the earnings of employees in all industries and occupations. The data have been aggregated at occupation level and industry level. We use the data on the number of employees, the average gross weekly and hourly earnings by gender in each occupation (and industry respectively) cell, for every year and also average numbers of total hours worked.

3.1.2 Skills Survey, 1997

This is a cross sectional survey conducted by the Social and Community Planning Research and funded by the Economic and Social Research Council. The purpose of the survey is among others to develop the methodology of measuring different types of skills and investigate changes of skills during the 1990s and their distribution among the employed population. The dataset contains information on people in work and their jobs such as job

⁹Data for 2000 have recently become available but we have worked on the period the period between 1975-1999.

details, management skills, transferability of skills, pay and qualifications.

In one section of the survey workers are asked about the types of activities involved in their jobs. They have to say how important is a particular activity (skill or task) in their job and their answers range from 1 to 5 i.e. from essential to not at all important/ does not apply. We have conducted the analysis by using either ordered probit or ordinary probit. In the second case, the dummy variables are constructed to be equal to one if the skill is essential or very important and zero otherwise. The skill variables used are listed in Table A.1 in the Appendix. In addition we use controls for education described in Table A.1 also in the appendix.

3.2 The Research Design

In the first part we attempt a descriptive approach in order to shed more light to the position of female workers in the labour market in the UK. We report employment ratios for women relative to men, by occupation for the period 1975-1999. In addition we construct segregation indices¹⁰ to investigate whether women started entering previously male dominated occupations. Then wage ratios are also calculated to describe the gender wage gap trends for the last twenty five years. This is done for all workers

¹⁰Reported in appendix A.2

and then separately by age and education group.

In the second part we investigate the gender intensity of certain skills, which are thought to be crucial in the new economy (estimate probit models). Next the intensity of each skill by industrial sector is estimated. A rather strong assumption about the skill structure within sectors enables us to estimate trends of the demand for certain skills through the last two decades. Finally we compute an index of the relative demand for women operating via the increased demand for their particular skills arising from shifts in industry composition¹¹.

¹¹In a different version of the paper we try to estimate the returns to certain skills and computer use. The methodology used is a multivariate analysis, mainly least squares and in some cases logit/probit, ordered probit and instrumental variables techniques. We follow several specification procedures to capture any skill and computer premia and ensure that these do not reflect unobserved ability. In addition we pay particular attention to the differences in the returns to different skills and the use of computers between men and women. The main difficulty with the analysis of returns to new technologies and/or new work practices lies in the identification of pure returns, compared to increases in wages due to higher skills that may be correlated with the use of new equipment. This is closely linked to the way new technologies are allocated in the workplace, or in other words how workers are selected to work with a new technological equipment, computer etc. We believe that this must be related to the nature of the tasks performed by the worker and the increase in its productivity that will follow the introduction of the new technology. We argue that highly skilled/educated workers are first chosen to work with the new technologies because this is more profitable. The main results suggest that there are significant returns to organisational and supervising skills, especially for female workers. In addition I find computer premia, which become quite small in the panel regressions and are close to zero for women.

4 The Position of Women in the Labour Market

4.1 Employment Growth

Our purpose here is to demonstrate how the position of women in the labour market has improved in employment terms¹². We use the ratio of female to male workers as a measure of relative employment for women and the results are reported in Tables 1 and 2. There is positive relative employment growth in the period 1975-1999 which is especially large in certain types of jobs. The female ratio has risen sharply for both managers (0.28 in 1975 to 0.48 in 1999) and professionals (0.46 to 0.83) at a time when both these were themselves expanding.

4.2 Wages

4.2.1 Gender Wage Ratios by Occupation

Having documented the improved position of women on the employment front, we turn now to analyse relative wages. In this sub-section we examine the trends in the gender wage ratios by occupation group by looking at the

¹²Nickell (1999) documents very different trends of the unemployment rates for men and women. In particular he provides evidence that unemployment among women is now consistently lower than among men, the gap being noticeable in the early 1990's. The gap is also consistent across age groups and it has grown since the 1970's. In unemployment terms women have certainly done better than men over the last two decades despite their increasing participation rates over the same period.

Ratios of Persons (Women/Men)						
All Workers						
	1975	1980	1985	1990	1995	1999
Managers	0.28	0.3	0.32	0.37	0.43	0.48
Professionals	0.46	0.48	0.53	0.56	0.76	0.83
Prof & Techn	0.73	0.8	0.97	1.01	1.06	1.12
Clerical-Secretarial	1.78	2.06	2.24	2.73	2.94	2.8
Craft	0.15	0.14	0.14	0.13	0.12	0.11
Pers/Protect services	1.1	1.41	1.35	1.47	1.67	1.78
Sales	1.31	1.49	1.5	1.68	1.68	1.8
Plant & machines Operatives	0.28	0.29	0.28	0.29	0.28	0.25
Others	0.66	0.860	0.9	0.88	0.99	0.89

Table 1: Ratio of Persons: All Workers

Ratios of Persons (Women/Men)						
Full-Time Workers						
	1975	1980	1985	1990	1995	1999
Managers	0.25	0.26	0.29	0.34	0.39	0.44
Professionals	0.41	0.42	0.46	0.48	0.63	0.7
Prof & Techn	0.61	0.65	0.78	0.8	0.79	0.8
Clerical-Secretarial	1.51	1.7	1.86	2.2	2.28	2.13
Craft	0.12	0.12	0.12	0.11	0.11	0.09
Pers/Protect services	0.72	0.8	0.75	0.81	0.92	0.97
Sales	0.83	0.88	0.84	0.9	0.82	0.91
Plant & machines Operatives	0.21	0.23	0.22	0.24	0.24	0.21
Others	0.29	0.32	0.3	0.28	0.32	0.28

Table 2: Ratio of Persons: Full-Time Workers

nine main occupation groups. In Tables 3, 4 and 5 we report evidence on hourly earnings.

In 1999 there is still evidence of a gender gap in craft occupations whereas it is much smaller and almost non-existent among clerical and secretarial and also professional occupations. Examining the trend of the gender wage gap, we find that this has been particularly small in some occupations such as professionals ever since 1975. For all occupational groups, there has been a steady rise in the gender ratio but this has been most pronounced in three groups: managers, clerical and secretarial and sales. The relative pay of women is worst in craft occupations, where there are few women anyway. A big rise in the gender ratio has occurred for sales occupations and also for managers. This suggests that women, not only start entering previously male dominated occupations which have been traditionally better paid, but also they get wage gains even in female dominated occupations such as sales. As shown in table 5, part time women are doing very well in most occupations. In personal and protective services as well as clerical and secretarial occupations, the gender wage ratio is greater than one.

Wage Ratios by Occupation, W^F/W^M						
Hourly Wage - All Workers						
	1975	1980	1985	1990	1995	1999
Managers	0.613	0.635	0.633	0.656	0.721	0.743
Professionals	0.917	0.862	0.872	0.894	0.925	0.923
Prof & Techn	0.728	0.716	0.713	0.798	0.813	0.801
Clerical-Secretarial	0.748	0.775	0.786	0.856	0.899	0.935
Craft	0.643	0.677	0.652	0.665	0.672	0.693
Pers/Protect services	0.717	0.671	0.642	0.664	0.719	0.721
Sales	0.553	0.601	0.623	0.64	0.672	0.724
Plant & machines Operatives	0.676	0.714	0.715	0.721	0.759	0.759
Others	0.736	0.741	0.72	0.737	0.758	0.761

Table 3: Hourly Wage Ratio: All Workers

Wage Ratios by Occupation, W^F/W^M						
Hourly Wage - Full-Time Workers						
	1975	1980	1985	1990	1995	1999
Managers	0.631	0.659	0.658	0.676	0.739	0.753
Professionals	0.932	0.877	0.895	0.905	0.939	0.926
Prof & Techn	0.724	0.716	0.711	0.802	0.832	0.815
Clerical-Secretarial	0.752	0.785	0.802	0.88	0.921	0.951
Craft	0.65	0.683	0.656	0.674	0.68	0.7
Pers/Protect services	0.715	0.676	0.668	0.695	0.73	0.72
Sales	0.553	0.601	0.639	0.662	0.693	0.729
Plant & machines Operatives	0.677	0.722	0.725	0.731	0.772	0.766
Others	0.733	0.767	0.76	0.776	0.774	0.768

Table 4: Hourly Wage Ratio: Full Time Workers

Wage Ratios by Occupation, W^F/W^M						
Hourly Wage -Part-Time Workers						
	1975	1980	1985	1990	1995	1999
Managers	0.798	0.658	0.805	0.751	0.614	0.718
Professionals	0.816	0.691	0.696	0.812	0.87	0.942
Prof & Techn	1.001	0.797	0.935	0.971	1.047	0.996
Clerical-Secretarial	0.968	0.946	0.94	0.982	1.052	1.028
Craft	0.915	0.803	0.855	0.838	0.792	0.718
Pers/Protect services	1.064	1.092	0.953	1.003	1.051	1.064
Sales	0.923	0.938	1.097	1.109	0.996	0.995
Plant & machines Operatives	1.037	0.93	0.906	0.905	0.862	0.848
Others	1.064	1.02	0.952	1.014	0.997	0.936

Table 5: Hourly Wage Ratio: Part Time Workers

4.2.2 Wage Ratios by Age

In the related literature, young women are expected to be doing better than older ones because they are better educated and skilled and thus enter the labour market under more favourable conditions. Improvements in the relative wages of women are expected to differ for different age groups. In this section we investigate the trend of gender wage ratios, by age groups. Table 6 present gender wage ratios¹³ for all workers. Looking at hourly wages, in 1999, the least advantaged group is that of 35-44 in 1975 and that of 45-54. For the group of full time workers the wage ratios are higher than those for all workers, in all age groups, as expected. In addition the gender wage ratio declines with age and the most advantaged group is that of young

¹³Wage Ratios are defined as follows:
 $\exp(\ln w^F - \ln w^M)$

workers. In 1979, this is 0.82 for the young group whereas it is only 0.73 for the older group (looking at hourly earnings). In 1999 these ratios are 0.95 and 0.81 respectively.

In Tables 8-10 we calculate changes in the two sub periods and we also examine the within cohort change in the gender ratio. As it can be seen in Table 8, women saw their wages to increase significantly relative to men in both sub-periods. There has also been an acceleration of the rate of increase in the gender ratio for the groups of 35-44, 45-54 and 54-65 in the second sub-period. In detail the biggest increase occurred among those aged 35-44 and 45-54 in the second sub period and those 25-34 year old.

Many researchers argue that the increase in the gender earnings ratio can represent the entry of new cohorts in the labour market and/or improvements within specific cohorts. To investigate the second part we look at changes in wage ratios within cohorts, for the two sub-periods. This corresponds to the diagonal elements of Tables 6-7 which consist part of Tables 8-10. In Table 8, it can be seen that there are improvements in the gender ratios within cohorts and particularly for the 25-34 and 35-44 cohorts in 1979. As those workers grow older, women improve their earnings position relative to men, partly because these cohorts may be better prepared for the labour market, and more highly skilled.

Wage Ratios by Age Group, W^F/W^M					
Hourly Wage- All time Workers					
	18-24	25-34	35-44	45-54	55-65
1975	0.83	0.71	0.63	0.65	0.69
1980	0.85	0.73	0.64	0.66	0.68
1985	0.87	0.78	0.62	0.64	0.67
1990	0.91	0.8	0.64	0.64	0.7
1995	0.92	0.84	0.69	0.65	0.71
1999	0.94	0.84	0.72	0.68	0.73

Table 6: Gender Wage Ratios: All Workers

Wage Ratios by Age Group, W^F/W^M					
Hourly Wage- Full time Workers					
	18-24	25-34	35-44	45-54	55-65
1975	0.83	0.75	0.68	0.68	0.74
1980	0.85	0.79	0.7	0.72	0.75
1985	0.87	0.84	0.71	0.72	0.76
1990	0.92	0.87	0.73	0.72	0.79
1995	0.93	0.91	0.77	0.72	0.78
1999	0.95	0.9	0.8	0.74	0.81

Table 7: Gender Wage Ratios: Full-Time Workers

The growth rate of gender ratios is positive for both sub-periods and there is even an acceleration for the age group 35-44. In Table 9 we report the changes for 1989-1979 and 1999-1989 both between and within cohorts. Women in the 35-44 cohort in 1979 are doing much better during the next 20 years. The same is true for the younger cohorts, aged 18-24 and 25-34.

Wage Ratios by Age Group, W^F/W^M						
Hourly Wage - All Workers						
		18-24	25-34	35-44	45-54	55-65
Between Cohorts	1989-1979	0.062	0.077	0.007	-0.012	0.007
	1999-1989	0.032	0.042	0.078	0.044	0.042
Within Cohorts	1989-1979	-0.042	-0.083	0.008	0.037	—
	1999-1989	-0.082	0.045	0.091	—	—

Table 8: Changes in Gender Ratios: All Workers

Wage Ratios by Age Group, W^F/W^M						
Hourly Wage - Full Time Workers						
		18-24	25-34	35-44	45-54	55-65
Between Cohorts	1989-1979	0.068	0.089	0.035	0.013	0.039
	1999-1989	0.035	0.033	0.068	0.013	0.023
Within Cohorts	1989-1979	0.026	-0.05	0.028	0.075	—
	1999-1989	-0.071	0.006	0.085	—	—

Table 9: Changes in Gender Ratios: Full-Time Workers

Wage Ratios by Age Group, W^F/W^M						
Hourly Wage - Part Time Workers						
		18-24	25-34	35-44	45-54	55-65
Between Cohorts	1989-1979	0.039	0.306	0.124	0.078	0.065
	1999-1989	0.066	0.04	0.043	-0.007	-0.039
Within Cohorts	1989-1979	-0.07	0.14	0.12	0.25	—
	1999-1989	-0.13	-0.02	0.13	—	—

Table 10: Changes in Gender Ratios: Part-Time Workers

W^F/W^M by Age Group				
Hourly Wage - Full-Time workers				
	1975	1981	1989/90	1996/97
Higher Degree	0.63	0.677	0.677	0.726
Teaching, other higher ql	0.57	0.748	0.779	0.81
GCE A-level	0.58	0.657	0.712	0.66
GCSE O-level	0.58	0.677	0.677	0.73
Other qualif.	0.52	0.613	0.705	0.787
No qualif.	0.52	0.606	0.637	0.677
Hourly Wage - Part-Time workers				
	1975	1981	1989/90	1996/97
Higher Degree	0.527	0.477	0.57	0.677
Teaching, other higher ql	0.549	0.501	0.90	1.04
GCE A-level	0.844	0.86	0.93	0.887
GCSE O-level	1.31	1.92	1.16	1.40
Other qualif.	0.726	0.72	0.57	1.02
No qualif.	1	1.23	1.35	0.95

Table 11: Wage Ratios by Education Level

4.2.3 Wage Ratios by Education Level

In Table 11 we report wage ratios for the years 1975, 1981, 1989/90 and 1996/97 by education level¹⁴. We note that during the last 20 years, women experienced large increases in their earning relative to men, within all education groups. Among full time workers the narrowing of the gender wage gap is more pronounced for teachers, nurses and other higher degree holders as well as for lower qualification groups such as clerical and apprenticeships.

¹⁴The data source is the General Household Survey (GHS)

5 Trends in the Demand for Skills

Having documented the improved position of women in the UK labour market, we now focus on the possible reasons for this improvement. To start, we claim that women are more likely than men to make use of certain specific skills at work. The technological revolution and its effects on the organisation of work have increased the importance of these skills in the labour market. In particular, social and communication skills have been favoured in the new economy. Some would argue that this may be due to the high growth rates of the service sector of the economy and the relative decline of manufacturing. Given that social and interpersonal skills are more important in the service sector, the different growth rates may be playing an important role in the demand for these skills. Here, we argue that the growth of specific sectors of the economy relative to others may have affected the gender composition of the demand for labour and helped women to improve their position in the labour market. A counterargument would be that technical change has also altered the composition within all sectors of the economy. In other words one could argue that the demand for interpersonal skills has also increased in non service sectors. Although this may be true for some sectors, we don't think that the demand for specific skills in sectors such as mining etc. has changed significantly in the last two or

three decades. And even if there have been noticeable changes, they should not be as pronounced as those in the service sectors. Unfortunately the data available do not allow for an examination of this issue.

With t referring to time, we define μ_{ijt} as the proportion of workers in industry j who use skill i , derive either as the marginal effect from a probit analysis (see section 7), or as $\mu_{ijt} = \frac{T_{ijt}}{L_{jt}}$, where T_{ijt} is the number of workers using skill i , in industry j , in time t and L_{jt} is the employment in industry j . Next define S_{jt} as the industry employment share, that is $S_{jt} = \frac{L_{jt}}{\sum_{j=1}^J L_{jt}}$, and θ_{it} as the proportion of those using skill i who are women.

We can then define a person with all I skills as a fully skilled person and a person with $I' \leq I$ skills as a fraction (I'/I) of a fully skilled person. Then $\frac{1}{I} \sum_i \sum_j \mu_{ijt} S_{jt} L_t$ is the number of fully skilled equivalent persons and $\frac{1}{I} \sum_i \sum_j \theta_{it} \mu_{ijt} S_{jt} L_t$ is the number of fully skilled equivalent women, say N_{st}

The change in the proportion of fully skilled equivalent women in the total employment, N_{st}/L_t , between 1 and T is given by equations 1 and 2.

So the change in women's employment can be split into three components which we set out in Table 12. Of these components, I and III can be thought of as reflecting changes in the demand for women (relative to men) driven by shifts in industrial composition towards sectors which use more female intensive skills and by increases in female intensive skills within

Components of the change in female employment	
Components	
I	$\frac{1}{I} \sum_i \sum_j \mu_{ijT} \theta_{iT} (S_{jT} - S_{j1})$ <p>the change in demand for female intensive skills due to changes in industrial composition</p>
II	$\frac{1}{I} \sum_i \sum_j (\theta_{iT} - \theta_{i1}) \mu_{jiT} S_{j1}$ <p>the change in female employment due to changes in the female intensity of skills</p>
III	$\frac{1}{I} \sum_i \sum_j (\mu_{ijT} - \mu_{ij1}) \theta_{i1} S_{j1}$ <p>the change in demand for female intensive skills due to within industry changes in skill composition</p>

where:

$S_{jt} = \frac{L_{jt}}{\sum_{j=1}^J L_{jt}}$, the industry employment share,

L_{jt} being employment in industry j at time t, j=1,...,J

$\mu_{ijt} = T_{ijt}/L_{jt}$, the proportion of employees in industry j with skill i,
at time t, i=1,...,I,

T_{ijt} being the number of employees with skill i in industry j at time t.

θ_{it} = proportion of those using skill i who are women

Table 12: Components of the change in female employment

sectors. Component II, on the other hand is fundamentally neutral with regard to gender demand, so long as employers are indifferent to gender when employees have identical skills. It then simply reflects the increased supply of women with skills.

$$(N_{sT}/L_T) - (N_{s1}/L_1) = \frac{1}{I} \sum_i \sum_j \mu_{ijT} \theta_{iT} S_{jT} - \frac{1}{I} \sum_i \sum_j \mu_{ij1} \theta_{i1} S_{j1} \quad (1)$$

$$\begin{aligned} (N_{sT}/L_T) - (N_{s1}/L_1) = & \quad (2) \\ & \frac{1}{I} \sum_i \sum_j \mu_{ijT} \theta_{iT} (S_{jT} - S_{j1}) \\ & + \frac{1}{I} \sum_i \sum_j (\theta_{iT} - \theta_{i1}) \mu_{ijT} S_{j1} \\ & + \frac{1}{I} \sum_i \sum_j (\mu_{ijT} - \mu_{ij1}) \theta_{i1} S_{j1} \end{aligned}$$

It would be very interesting to quantify these three different components and distinguish among the three different effects. However, as already mentioned, there are difficulties associated with the data. It is extremely difficult to find skill data for a long period in order to estimate the size of each effect. In this study and given the available data, we derive only estimates for the

first and second term. In order to do this, we need estimates of θ_{it} and μ_{ijT} .

These are generated in the next two sections.

6 The Female Intensive Skills

In this section we investigate the gender intensity of the wide range of skills set out in Table A.1, in appendix A.1. All these tasks are of primary importance in many sectors of the economy. To analyse gender intensity, we estimate probit regressions, for all skills of the form:

$$T = F(\alpha + \gamma FEM + \beta X) \quad (3)$$

T describes the probability that a specific skill is used intensively at work. Vector X includes controls for qualifications held by the worker and FEM is a dummy variable equal to one if the individual is female. We first want to examine if, for any specific skill, the probability of a person using it is higher if the person is female. So we calculate the marginal effect on skill use of being a female ($\hat{\zeta}$, say) and we interpret it as the differential effect of being female on the probability of using the skill at work. These effects are listed in Table 13 (an asterisk means 5% significance). We find some

of these skills to be female intensive, the marginal effects being large and statistically significant in many cases. Among the total of workers, women are more likely than men to deal with people, listen to colleagues, undertake counselling and work in teams. Some of those marginal effects are sizeable and most of them statistically significant. In particular female workers are 7% more likely than men to deal with people, 17% more likely to counsel, 8% more likely to work in teams and 9.6% more likely to listen to colleagues. In addition they are 16% more likely to be using computers and 8% more likely to organise their own time as part of their work duties.

Among full time workers, counselling and advising or caring for customers or clients as well as computer use are the most female intensive skills. Women are 17% more likely to be working in jobs where these skills are essential or important. These two coefficients are very large in magnitude and highly significant. In addition full time women are more likely than men to use skills associated with dealing with people, working in teams, listening to colleagues as well as organising their own time as part of their job. Knowing how the organisation works also appears to be more female intensive. Full time female workers are 6.8% more likely than men to work in teams and 6.9% more likely to be dealing with people. However it is surprising that selling a product or service does not turn out as a female

intensive characteristic. In addition women are more frequently asked to organise their own time as part of their job duties.

Similarly, among part time workers, the female skills are those associated with contacts with other workers and/or customers. Again, they are more likely to give advice, work in teams and listen to colleagues, these marginal effects being even higher than those in the full-time sub sample. Part time women are 21% more likely to use their counselling and advising skills as part of their job duties. This percentage is 19% for listening to colleagues and 17% for team work.

We repeat the analysis by splitting workers into two groups: the qualified and the unqualified ones. In Table 14, marginal effects for all, full-time and part-time workers are listed again. This time we split the sample into only two education groups, the qualified and unqualified. These results will also be used in section 8 where we'll estimate the trends in the demand for specific skills and activities.

Finally, we wish to use the results in this section to compute θ_{it} , the proportion of those using skill i who are women. From the probit, we can estimate the probability that a man uses skill i , x_i , say and the probability that a woman uses skill i , $x_i + \hat{\zeta}_i$. So if L_{mt} is the number of male employees and L_{ft} is the number of women employees, then

Probit with D=1 if essential, v. important						
	All		Full Time		Part Time	
	$\hat{\zeta} =$ dF/dX	s.e.	$\hat{\zeta} =$ dF/dX	s.e.	$\hat{\zeta} =$ dF/dX	s.e.
Deal with people	0.069	0.017	0.069	0.018	0.06	0.056
Training, Teach.	0.031	0.024	0.027	0.025	0.09	0.066
Speeches	-0.010	0.017	-0.001	0.020	-0.06	0.05
Persuading	-0.012	0.024	-0.01	0.026	-0.03	0.07
-Influencing						
Selling product and services	-0.008	0.023	-0.007	0.025	-0.03	0.07
Counsel, advise	0.17	0.023	0.167	0.025	0.21	0.69
Team work	0.08	0.021	0.068	0.021	0.17	0.068
Listen to colleg.	0.096	0.021	0.08	0.021	0.19	0.068
Tools/Machines	-0.14	0.024	-0.15	0.025	-0.06	0.068
How org. works	0.12	0.024	0.11	0.024	0.14	0.066
Computer use	0.16	0.024	0.17	0.026	0.09	0.06
Find cause of problems	-0.016	0.022	-0.032	0.023	0.12	0.07
Solution to pbl	-0.028	0.023	-0.034	0.023	0.04	0.07
Analyse compl. problems	-0.009	0.024	-0.018	0.026	0.039	0.06
Plan own activ.	0.021	0.023	0.019	0.023	0.028	0.072
Plan others activ.	-0.002	0.023	0	0.025	0	0.06
Organise own time	0.077	0.022	0.072	0.022	0.087	0.07
Thinking ahead	0.0001	0.021	-0.01	0.022	0.07	0.07
Calcul. adv tech.	-0.016	0.017	-0.025	0.020	0.046	0.032

Table 13: Female Marginal Probability of using the Skill in Work

Probit with D=1 if essential, v. important						
Marginal Effects $\zeta = dF/dX$						
	All		Full Time		Part Time	
	QFA1	QFA2	QFA1	QFA2	QFA1	QFA2
Deal with people	0.07*	0.063*	0.07*	0.06*	0.064	0.05
Training, Teaching	0.061*	-0.004	0.052	-0.01	0.116	0.04
Speeches	0.004	-0.029	-0.004	0.005	0	-0.27*
Persuade-Influence	0.009	-0.038	0.001	-0.025	0.035	-0.13
Selling product services	-0.014	-0.001	-0.02	0.137	0.024	-0.11
Counsel, advise	0.2*	0.13*	0.176*	0.15*	0.35*	-0.009
Team work	0.076*	0.086*	0.061*	0.078*	0.19*	0.135
Listen to colleagues	0.092*	0.1*	0.073*	0.089*	0.19*	0.175
Tools/Machines	-0.166*	-0.11*	-0.186*	-0.1*	-0.001	-0.156
How org. works	0.14*	0.08*	0.14*	0.06	0.141	0.134
Computer use	0.19*	0.11*	0.19*	0.138*	0.18*	-0.08
Finding cause of problems	-0.012	-0.019	-0.039	-0.02	0.2*	-0.004
Solution to pbl	-0.022	-0.003	-0.04	-0.019	0.13	-0.096
Analyse complex problems	0.021	-0.055	-0.005	-0.035	0.17*	-0.195
Plan own activ.	0.018	0.025	0.004	0.037	0.1	-0.09
Plan others activ	0.041	-0.06	0.03	-0.046	0.1	-0.177
Organising own time	0.07*	0.08*	0.055	0.085*	0.146	-0.016
Thinking ahead	-0.016	0.025	-0.038	0.027	0.114	-0.008
Calculations with adv. techniques	0.002	-0.043	-0.009	-0.02	0.066	0.013

Table 14: Marginal Effects for Females by Education Group: All, Full time and Part time

$$\hat{\theta}_{it} = \frac{(x_i + \hat{\zeta}_i)L_{ft}}{x_i L_{mt} + (x_i + \hat{\zeta}_i)L_{ft}} \quad (4)$$

or

$$\hat{\theta}_{it} = \frac{(x_i + \hat{\zeta}_i)\sigma_{ft}}{x_i + \hat{\zeta}_i\sigma_{ft}} \quad (5)$$

where σ_{ft} is the proportion of employees who are women. We have calculated θ_{it} for all years, but we only report them for 1975 and 1999 in table 15. This is done separately for all workers and full-time and part-time workers. To construct the series of θ_{it} for all years we have to make the assumption that probability of a woman using a certain skill has not changed over time. This can be questioned but the data oblige us to impose the restriction.

7 Industry Skill Intensity

Having analysed the gender intensity of skills, we next consider the intensity of use of each skill by industry. To do this, we calculate the percentage of

θ_{it} : proportion of those using skill i who are women 1975-1999						
	All		FT		PT	
	1975	1999	1975	1999	1975	1999
Deal with people	0.38	0.50	0.32	0.41	0.68	0.84
Training, Teaching	0.35	0.47	0.31	0.41	0.70	0.84
Speeches	0.31	0.42	0.31	0.41	0.52	0.71
Persuade-Influence	0.33	0.44	0.30	0.40	0.62	0.79
Selling product services	0.36	0.47	0.29	0.39	0.65	0.81
Counsel, advise	0.43	0.55	0.36	0.46	0.74	0.87
Team work	0.38	0.50	0.32	0.41	0.72	0.86
Listening to colleagues	0.38	0.49	0.32	0.42	0.73	0.86
Tools/machines	0.29	0.40	0.24	0.32	0.64	0.81
How org works	0.38	0.50	0.34	0.44	0.73	0.86
Computer use	0.39	0.51	0.37	0.47	0.70	0.84
Finding cause of problems	0.33	0.44	0.29	0.38	0.71	0.85
Solution to pbl	0.33	0.44	0.291	0.382	0.67	0.83
Analyse complex problems	0.32	0.43	0.297	0.39	0.677	0.83
Plan own activ.	0.34	0.46	0.31	0.40	0.66	0.82
Plan others activ.	0.33	0.44	0.31	0.40	0.64	0.81
Organising own time	0.36	0.48	0.32	0.42	0.69	0.84
Thinking ahead	0.34	0.46	0.30	0.39	0.69	0.84
Calculations adv. techniques	0.30	0.41	0.27	0.36	0.75	0.88

Table 15: thetas: proportion of those using skill i who are women

people working in the industry who use the specific skill at work¹⁵. This is the basis for comparing the proportions μ_{ijt} , the proportion of those working in industry j who use skill i . So we compute μ_{ijT} by $\mu_{ijT} = T_{ijT}/L_{jt}$ T_{ijT} is the number of workers in industry j with skill i and L_{jt} is the number of employees in industry j and $T=1997$.

Furthermore we want to investigate if these proportions differ between educational groups and we calculate the same percentages by splitting each industry cell into two cells, one for skilled workers and one for the low skilled.¹⁶

We find that the use of certain skills is imperative in specific industries of the economy as expected. Dealing with people is extremely important in the service sector. In particular in transport, telecommunications, banking and financial intermediation, real estate, accounting and finance, regulation and education as well as health sectors and radio and television related

¹⁵We have used an alternative method to estimate the proportion of people using a specific skill in every industry cell. This consists of probit regressions such as $T = F(\delta + \beta X + \pi I)$, where I is a vector containing dummies for each industry cell. Then we use the estimated $\hat{\pi}$'s (π_{it} can be viewed as the proportion of those with skill i who are women) to calculate the marginal effects ($\hat{\mu}_{it}$ which is the proportion of workers in industry j with skill i) as measure of the skill intensity of each industry. However many dummy variables are dropped in the estimation, because of the small number of observations. For this reason we use the method discussed above. However the results we obtain from the two methods are very similar.

¹⁶Alternatively we could estimate probit regressions and add interaction effects of the industry dummies with two education dummies. Again we have to use the first method because of the small sample size and thus the small size -often zero- of the individual cells.

jobs. Furthermore persuading and influencing others is crucial in banking, financial intermediation, insurance and hospital care. The same holds for counselling and advising clients and customers, which is in addition essential in sectors such as sales, hotels and restaurants and water and gas supply. Working in teams is a skill which is used in almost all sectors and the percentage of workers who use it in everyday working life is particularly high. By contrast, the percentage of people who are asked to plan the activities of others as part of their job is small in all industries. However that of workers organising their own activities is high in some sectors of the economy, that is in banking, insurance, data processing and R&D, security and financial intermediation, as well as education and regulation, and some sectors of manufacturing such as chemicals, ceramics and PC/office equipment. Listening carefully to people is an important skill in many industries, especially in the service sector but also in some sectors in manufacturing.

8 Trends in the Demand for Women

In a final step, we return to the components of female employment change presented in Table 12. Of these three components, I and III we see as reflecting two aspects of the increase in the demand for women. Given our data, we are able to estimate I and II but not III because we only observe

μ_{ijt} at $t=T=1997$. Focusing on I in Table 12 we first look at changes in the demand for each separate skill (indexed by i) given by $\sum_j \mu_{ijT}(S_{jT}-S_{j1})$, where the skill intensities, μ_{ijT} , were estimated in Section 7. Note, we assume in this calculation that the skill intensities are time invariant, ignoring the within industry changes in skill intensities.

We divide the sample into two sub-groups: low and highly qualified¹⁷. In table 16 we report these calculations for 1975 and 1999 for each skill, for all workers, full timers and part time workers, whereas in tables 17-19 we repeat the same exercise for two qualification groups within each broad group (of all, full time and part time workers). In each table, we show $\sum_j \hat{\mu}_{ijT}S_{jT}$ and $\sum_j \hat{\mu}_{ij1}S_{j1}$ where T is 1999 and 1 is 1975¹⁸. To begin with there is evidence of increased demand for most of the 'people' skills. By contrast, there seems to exist a downward trend in the demand for the use of tools and machines and tasks which have to do with solutions/analyses of problems, at least among full time workers. So there is some evidence that communication and social skills are more demanded today than 20 years ago.

¹⁷Ideally we would like to be able to do this for industry-occupation cells but this is impossible because of the small sample size and the small number of observations in some of the cells.

¹⁸However the $\hat{\mu}$ are computed for 1997.

The highest growth rates occur in the demand for counselling and advising. This holds for all workers, full time and part time workers. In addition when we decompose the sample into qualified and unqualified workers, the demand for counselling exhibits the highest growth. Second there is a growing demand for 'influencing and persuading others at workplace' skills, with growth rates especially high for full time workers. We find an increase in the demand for 'speeches and presentations' skills as well as for organising other people's activities. In general the demand growth for social skill is much higher than any other skills within all groups of workers, suggesting very similar trends for all workers. It is not surprising that there is falling demand for the use of tools and calculations with advanced techniques (the second only for the group of all workers).

Examining tables 17-19, the main observation is that the positive trend for the demand for certain skills is much stronger for the group of qualified workers. There are many similarities for the groups of all workers and full timers, with increasing demand for dealing with people, persuading/influencing others, counselling and making speeches and presentations.

The skills that have been mostly favoured within the group of qualified workers are exactly those we identified in the previous section as female intensive.

Demand for Skills, 1975-1999						
	All		FT		PT	
	1975	1999	1975	1999	1975	1999
Deal with people	0.39	0.42	0.33	0.35	0.67	0.75
Training, Teaching	0.24	0.25	0.21	0.23	0.33	0.38
Speeches	0.07	0.08	0.08	0.10	0.09	0.08
Persuade/ Influence	0.18	0.20	0.17	0.20	0.27	0.28
Selling product	0.18	0.19	0.15	0.16	0.32	0.33
services						
Counsel, advice	0.28	0.32	0.23	0.28	0.49	0.56
Team work	0.36	0.36	0.31	0.32	0.57	0.61
Listening to colleagues	0.36	0.36	0.31	0.32	0.56	0.61
Tools/machines	0.22	0.20	0.20	0.18	0.30	0.33
How org works	0.28	0.29	0.25	0.27	0.43	0.44
Computer use	0.22	0.23	0.22	0.24	0.29	0.30
Finding cause	0.31	0.30	0.28	0.29	0.46	0.47
of problems						
Solution to pbl	0.30	0.30	0.28	0.28	0.43	0.44
Analyse complex	0.19	0.19	0.19	0.20	0.23	0.24
problems						
Plan own activ.	0.30	0.31	0.28	0.29	0.44	0.45
Plan others activ.	0.14	0.16	0.14	0.16	0.19	0.22
Organising own time	0.32	0.34	0.30	0.32	0.50	0.51
Thinking ahead	0.32	0.33	0.30	0.31	0.48	0.51
Calculations adv.	0.08	0.07	0.07	0.07	0.09	0.09
techniques						

Table 16: Demand for Skills, 1975-1999

All Workers				
Demand for Skills, 1975-1999, by Education Group				
	Unqualified		Qualified	
	1975	1999	1975	1999
Dealing with people	0.38	0.41	0.42	0.44
Training, Teaching others	0.21	0.22	0.25	0.27
Making Speeches/ Presentations	0.05	0.05	0.10	0.11
Persuading-Influencing	0.15	0.16	0.23	0.25
Selling a product or service	0.17	0.18	0.20	0.21
Counselling, advising caring	0.27	0.31	0.29	0.33
Team work	0.35	0.35	0.36	0.38
Listening to colleagues	0.34	0.35	0.37	0.39
Using tools/machines	0.22	0.20	0.21	0.19
Knowledge of how your org works	0.26	0.26	0.31	0.32
Computer use	0.20	0.17	0.27	0.28
Finding cause of problems	0.29	0.28	0.33	0.32
Solutions to problems	0.26	0.26	0.33	0.33
Analysing complex problems	0.25	0.24	0.31	0.31
Planning own activities	0.26	0.26	0.35	0.36
Planning others activities	0.12	0.13	0.17	0.18
Organising own time	0.28	0.29	0.37	0.38
Thinking ahead	0.29	0.29	0.37	0.38
Calculations with adv. techniques	0.07	0.06	0.08	0.08

Table 17: Demand for Skills by Qualification Level, 1975-1999, All Workers

Full-Time Workers				
Demand for Skills, 1975 1999, by Education Group				
	Unqualified		Qualified	
	1975	1999	1975	1999
Dealing with people	0.31	0.34	0.34	0.36
Training, Teaching others	0.20	0.22	0.21	0.23
Making Speeches/ Presentations	0.06	0.06	0.09	0.12
Persuading-Influencing	0.14	0.16	0.19	0.21
Selling a product or service	0.14	0.15	0.15	0.17
Counselling, advising caring	0.22	0.26	0.22	0.27
Team work	0.30	0.31	0.30	0.32
Listening to colleagues	0.30	0.32	0.31	0.32
Using tools/machines	0.19	0.18	0.20	0.18
Knowledge of how your org works	0.24	0.25	0.26	0.28
Computer use	0.20	0.21	0.24	0.26
Finding cause of problems	0.26	0.27	0.29	0.29
Solutions to problems	0.25	0.26	0.28	0.29
Analysing complex problems	0.25	0.25	0.27	0.29
Planning own activities	0.25	0.26	0.31	0.32
Planning others activities	0.13	0.15	0.16	0.17
Organising own time	0.26	0.28	0.32	0.34
Thinking ahead	0.27	0.28	0.32	0.33
Calculations with adv. techniques	0.07	0.06	0.07	0.07

Table 18: Demand for Skills by Qualification Level, 1975-1999, Full-time Workers

Part-Time Workers				
Demand for Skills, 1975 1999, by Education Group				
	Unqualified		Qualified	
	1975	1999	1975	1999
Dealing with people	0.6	0.70	0.65	0.75
Training, Teaching others	0.27	0.30	0.36	0.45
Making Speeches/ Presentations	0.04	0.04	0.11	0.11
Persuading-Influencing	0.22	0.22	0.33	0.34
Selling a product or service	0.25	0.29	0.35	0.37
Counselling, advising caring	0.43	0.52	0.49	0.57
Team work	0.53	0.57	0.52	0.61
Listening to colleagues	0.51	0.56	0.51	0.61
Using tools/machines	0.29	0.32	0.22	0.29
Knowledge of how your org works	0.37	0.39	0.43	0.47
Computer use	0.23	0.24	0.33	0.37
Finding cause of problems	0.41	0.41	0.41	0.44
Solutions to problems	0.35	0.36	0.42	0.46
Analysing complex problems	0.29	0.33	0.39	0.43
Planning own activities	0.36	0.36	0.46	0.50
Planning others activities	0.14	0.16	0.22	0.24
Organising own time	0.41	0.42	0.51	0.56
Thinking ahead	0.39	0.43	0.50	0.53
Calculations with adv. techniques	0.06	0.06	0.12	0.14

Table 19: Demand for Skills by Qualification Level, 1975-1999, Part-time Workers

Demand for Women (Eq.6)			
	All Workers	Full-Time	Part-Time
1975	4.74	4.30	7.15
1981	4.79	4.36	7.43
1985	4.82	4.38	7.49
1991	4.88	4.48	7.46
1995	4.91	4.53	7.61
1999	4.91	4.58	7.61

Table 20: Demand for Women (via the Demand for Skills)

Having looked at changes in the demand for skills, we next use the female intensity coefficients for each skill, θ_{it} , calculated from equation 5 to provide an index for the relative demand for female employment, D_{ft} , via the increased demand for certain specific skills due to changes in industrial composition. From I, in table 12, we define

$$D_{ft} = \sum_{i=1}^I \sum_{j=1}^J \hat{\mu}_{ijT} \hat{\theta}_{iT} S_{jt} \quad (6)$$

where θ_{iT} is given in equation 5.

First in table 20, we report values of D_{ft} for various time periods for all workers, then full-time and part-time workers. Then, in table 21, we repeat the exercise, distinguishing between qualified and unqualified workers¹⁹.

Examining first table 20, one can see that there has been an increase

¹⁹QFA1 is the group of unqualified and QFA2 that of qualified workers.

Demand for Women, by Qualification Group, (Eq.6)						
	All Workers		Full-Time		Part-Time	
	QFA1	QFA2	QFA1	QFA2	QFA1	QFA2
1975	4.41	5.32	4.04	4.53	6.15	7.35
1981	4.44	5.37	4.096	4.59	6.44	7.81
1985	4.45	5.40	4.12	4.61	6.54	7.92
1991	4.52	5.48	4.20	4.70	6.58	7.81
1995	4.53	5.52	4.25	4.75	6.72	8.16
1999	4.50	5.53	4.28	4.79	6.70	8.24

Table 21: Demand for Women (via the Demand for Skills)

in the relative demand for females operating via the demand for certain skills. The biggest rise in the relative demand occurs for the group of full time women relative to full time men. However we also find an important rise in the relative demand for part time women. It seems that in the period between 1975 and 1991 there was a very sharp increase in the relative demand, which continued during the 1990's but at a slower rate. When we distinguish between unqualified and qualified workers, we note that the rise in the relative demand for women (is more important for the unqualified group, at least among full time workers) is much the same for qualified and unqualified full-time workers but, for part-time workers, the increase is concentrated among the qualified workers. Finally it is worth looking at the change in female employment which arises from the changes in the female intensity of skills, component II, in table 12.

9 Conclusion

Over the last two decades the position of women in the labour market has undoubtedly improved significantly in several developed countries. In this paper we document the changing labour market status of women in the UK, using data from the New Earnings Survey. We suggest technical change and the associated organisational change of work as one of the underlying explanations of this phenomenon. In particular we argue that the expansion of certain industries (services) along with work structure changes associated with organisational and technical changes may have played an important role in determining the position of female workers.

We identify the so called females skills (those which are more female intensive) and then we estimate the skill intensity of each industry in order to determine the relative importance of all skills for each industry. We find evidence of increased relative demand for females operating via the demand for certain skills. The biggest rise in the relative demand occurs for the group of full time women relative to full time men. However we also find an important rise in the relative demand for part time women.

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A Appendix

A.1 Data Description- The Skills Survey, 1997

Code	Skill Variables
ja2	dealing with people
ja3	instructing, training or teaching people, individually or in group
ja4	making speeches or presentations
ja5	persuading or influencing others
ja6	selling a product or service
ja7	counselling, advising or caring for customers or clients
ja8	working with a team of people
ja9	listening carefully to people
ja13	knowledge of how to use or operate tools/equipment/machinery
ja16	Knowledge of how your organisation works
ja17	using a computer, PC or other types of computerised equipment
ja20	working out the causes of problems or faults
ja21	thinking of solutions to problems
ja23	analysing complex problems in depth
ja26	planning your own activities
ja27	planning the activities of others
ja28	organising your own time
ja29	thinking ahead
ja38	calculations using more advanced math/stat procedures

Variable	SS 1997: Qualification Variables
Qual1	no qualifications
Qual2	CSE (<1) GCSE D-G,
Qual3	GSE 'O', GNVQ interm, GCSE A*-C, SCE 'O'
Qual4	GCE 'A', GNVQ Adv, SCE higher, HNC etc
Qual5	University certificate and diploma,
Qual6	Trade apprenticeship
Qual7	Nursing
Qual8	Teaching, other professional qualifications
Qual9	University or CNAA degree

A.2 Evidence from the Labour Market

A.2.1 Jobs for Women? Female Intensive Jobs

Women have started entering some previously male dominated sectors and jobs. To examine this further, we first look at different occupations and try to identify those where women are more represented than men, that is the female to male ratio is greater than one. Second we want to examine whether and how these have changed in the last 25 years, for which we have data from the NESPD. Undoubtedly there are specific types of jobs in which women are more represented than men. (These are mainly clerical and secretarial

jobs as well as jobs related with personal and protective service. Women are also over-represented in associate professional and technical occupations). In Appendix A.3 we report lists of the female intensive occupations for three years 1975, 1985 and 1999. In Appendix A.4 we do the same for all three years combined. We also report the ratio of female to male workers.

In 1975 there are 78 female intensive occupations out of the total of 376 occupations (see Table 22 in appendix A.2). Women are more represented in clerical and secretarial jobs and personal and protective service occupations. By 1985 the total number of female intensive occupations reached 80, slightly higher than that of 1975. There are no significant changes with the exception of a rise in the number of the female jobs in occupational group 3 (associate professional and technical occupations) and a small reduction in personal and protective service. By contrast, 1999 finds women in a significantly improved position relative to men. There is a sharp increase in female intensive occupations among managers and administrators (Group1) as well as professionals (Group 2). Overall we find that between 1975 and 1999, the number of female intensive occupations has risen from 21 to 44 in the top 3 occupation groups, an increase of 110 percent. In the remaining occupation groups, the increase was from 57 to 105, just over 80 percent.

In Table 23 we report the percentage of all and full time women who

Number of Female Intensive Jobs by Occupational Group			
	1975	1985	1999
Managers	4	4	8
Professionals	9	9	17
Assoc. Prof. and technical	8	13	19
Clerical/Secretarial	16	16	17
Craft	7	8	19
Pers. and Prot. services	15	12	15
Sales	7	5	7
Plant & mach. Oper.	4	3	14
Other Occup.	8	9	14

Table 22: Number of Female Intensive Jobs

work as managers, professionals and in associate professional and technical occupations (Major groups 1,2 and 3). Among all female workers (full time and part time) in 1975, only 4.5% and 7.4% worked in managerial and professional occupations respectively. In 1999, women have already entered some traditionally male dominated jobs and these percentages rise to 9.3% and 9.6%. In addition the percentage of women working in associate professional and technical jobs has gone up from 8.1% in 1975 to 12.2% in 1990 to fall slightly to 11.7% in 1999.

These trends are more pronounced among full time workers. Namely in 1975, 5.4% of full time female workers were employed as managers and 6.8 % in professional occupations. In 1999 these numbers rose to 13 and 12% respectively. Looking at the ratio of female to total workers in these occupations/ jobs is also of great interest. In particular, in 1975, 21% of

	Managers		Professionals		Associate Professional & Technical	
	ALL	FT	ALL	FT	ALL	FT
1975	0.045	0.054	0.074	0.068	0.071	0.081
1980	0.051	0.063	0.083	0.072	0.095	0.095
1985	0.057	0.071	0.093	0.083	0.101	0.118
1990	0.072	0.092	0.086	0.08	0.106	0.122
1995	0.083	0.116	0.093	0.107	0.1	0.113
1999	0.093	0.128	0.096	0.12	0.106	0.117

Table 23: Percentage of Women working as Managers and Professionals

managers were women whereas this number rises to 32% in 1999. This percentage is higher for professional occupations (34% in 1975 and 45% in 1999). Women represent 20% of full time managers in 1975, 25% in 1990 and 30% in 1999.

A.2.2 Segregation- Occupation

Women have been traditionally employed in low skilled occupations which offer low pay. The overcrowding of women into some occupations that pushes their wages down and reduces their career prospects in these jobs has been offered by many researchers as part of the explanation for the gender wage gap. There is international evidence that women have started entering traditionally male dominated occupations and achieving higher wages²⁰. To test more formally whether this is the case for the UK labour market, we

²⁰F.Blau, P.Simpson and D.Anderson (1998), Blau, F., and W. Hendricks (1979) and Blau, F., and L. Kahn (2000)

try to identify the female and male intensive occupations and investigate any significant changes occurring during the last 25 years.

We calculate the segregation index, developed by Duncan and Duncan (1955) given by:

$$S_t = 0.5 \sum \left| \frac{M_{it}}{\sum M_{it}} - \frac{F_{it}}{\sum F_{it}} \right| \quad (7)$$

for all years from 1975 to 1999. M_{it} / F_{it} is the number of males/females employed in occupation i , at time t . The index measures the proportion of females who would have to change occupations for the occupational distribution of women and men to be the same. If the index is zero then the share of female employment in each occupation is equal to that of male employment and there is no segregation.

It can be re-written as:

$$S_t = 0.5 \sum \left| \frac{m_{it}(M_{it} + F_{it})}{\sum [m_{it}(M_{it} + F_{it})]} - \frac{f_{it}(M_{it} + F_{it})}{\sum [f_{it}(M_{it} + F_{it})]} \right| \quad (8)$$

where $m_{it} = M_{it}/(M_{it} + F_{it})$ and $f_{it} = F_{it}/(M_{it} + F_{it})$, following the notation by Blau and Hendricks (1979).

The change in the index between periods 1 and 2, namely $S_2 - S_1$ can be decomposed into two components, that is:

$$S_2 - S_1 = \left[0.5 \sum \left| \frac{m_{i2}(M_{i1} + F_{i1})}{\sum [m_{i2}(M_{i1} + F_{i1})]} - \frac{f_{i2}(M_{i1} + F_{i1})}{\sum [f_{i2}(M_{i1} + F_{i1})]} \right| \right] - S_1 +$$

$$+ S_2 - \left[0.5 \sum \left| \frac{m_{i2}(M_{i1} + F_{i1})}{\sum [m_{i2}(M_{i1} + F_{i1})]} - \frac{f_{i2}(M_{i1} + F_{i1})}{\sum [f_{i2}(M_{i1} + F_{i1})]} \right| \right]$$

The first term represents the sex composition effect -or 'within' occupation effect-, that is the effect due to changes in sex composition within occupations. This is the change in the segregation index that would have occurred holding the size of each occupation constant at its initial level (so holding $M_{i1} + F_{i1}$ at the $t=1$ levels, in the beginning of the period). The second component, corresponds to the occupation mix effect -the 'between' effect- due to changes in the occupational mix of the economy, holding sex composition within occupations constant²¹. In this case, gender composi-

²¹We choose to use inconsistent weights so that the two components add up to the total change in the segregation index. Alternatively we could use consistent weights and allow for an interaction effect.

The data that have been used to calculate the segregation index, are the numbers of females, males, total workers in each occupation for the relevant years. We could

Segregation Index- Occupation				
Full-Time	Segregation	Total Δ	Between- Δ	Within- Δ
1975	58.64	—	—	—
1999	54.66	-0.047	-0.039	-0.008
Part-Time	Segregation	Total Δ	Between- Δ	Within- Δ
1975	55.98	—	—	—
1999	39.16	-0.19	-0.06	-0.13

Table 24: Segregation Index: Total Change and Decomposition

tion of each occupation is held constant, that is m_{i2} and f_{i2} are held at their $t=2$ levels (i.e. at the end of the period). There is evidence from several studies at European level that the female employment growth is mainly attributed to changes in the structure and scale of occupations rather than to increasing female shares of occupational groups. In other words we would expect to find the 'between' component to be responsible for the changes in the segregation index.

It can be seen in Table 24 that the segregation index has gone down for both groups of full and part-time workers. Especially in the second group, the segregation index has declined from 56 to 39.2 where the respective change for full timers is 58.7 to 54.7. In columns 4 and 5, we decompose the total change in the segregation index (column 3) into the two components: sex composition and occupational mix effect.

alternatively use the number of total hours worked, or the average hours worked by each group etc.

For full time workers the decline is mainly attributed to the 'between' component- the occupational mix of the economy. On the contrary, for part timers, it is due to within occupation changes, i.e. changes in the sex composition within occupations. This evidence can be part of the explanation offered in sections 5-8 according to which the growth of sectors-jobs-occupations where communication and other social skills are important, may have contributed to improvements in the position of women.

A.3 List of Female Intensive Occupations

fem75==1		
occ	Description	F75/M75
363	personnel and industrial relations officers	0.409836
699	other personal and protective service occupations nec	0.409938
559	other textiles, garments and related trades nec	0.416058
176	entertainment and sports managers	0.426667
863	weighers, graders, sorters	0.431035
239	other teaching professionals	0.432099
557	clothing cutters, milliners, furriers	0.433862
790	merchandisers	0.438776
691	bookmakers	0.458333
390	info officers	0.461539
622	bar staff	0.466102
349	other health associate professionals	0.466667
233	secondary education teaching professionals	0.469697
290	psychologists	0.470588
555	show repairers, leather cutters and sewers....	0.471745
722	petrol pump forecourt attendants	0.481482
420	filing, computer and other records clerks	0.498335
383	industrial designers	0.5
222	ophthalmic opticians	0.5
346	medical technicians, dental auxiliaries	0.5
270	librarians	0.5
241	barristers and advocates	0.5
862	packers, bottlers, canners, fillers	0.501208
463	radio and telegraph operators, other office communication system operators	0.50641
235	special education teaching professionals	0.509091
412	debt, rent and other cash collectors	0.512821
614	traffic wardens	0.528302
293	social workers, probation officers	0.539216
958	cleaners, domestics	0.541726
371	welfare, community and youth workers	0.550523
652	educational assistants	0.553398
562	bookbinders and print finishers	0.566667
673	launderers, dry cleaners, pressers	0.573883
410	accounts and wages clerks, book-keepers, other fin clerks	0.576974
172	hairdressers' and barbers' managers and proprietors	0.578947
641	hospital ward assistants	0.582279
813	winders, reelers	0.597403
661	beauticians and related occ	0.6
730	collector salespersons and credit agents	0.606061
411	counter clerks and cashiers	0.606124
670	domestic housekeeper and related occ	0.611111
430	clerks	0.616511
791	window dressers, floral arrangers	0.62
174	restaurant and catering managers	0.623037
370	matrons, houseparents	0.628378
720	sales assistants	0.637089
401	local gov clerical officers and assistants	0.640729
621	waiters	0.651822
421	library assistants/clerks	0.654321

Female Intensive Occupations in 1975

fem85=1		
occ	Description	F85/M85
191	registrars and admin of educational establishments	0.439024
691	bookmakers	0.444444
614	traffic wardens	0.446429
555	show repairers, leather cutters and sewers...	0.45
730	collector salespersons and credit agents	0.451613
390	info officers	0.453488
903	fishing and related workers	0.454546
557	clothing cutters, milliners, furriers	0.456376
130	credit controllers	0.459016
221	pharmacists/pharmacologists	0.461539
699	other personal and protective service occupations nec	0.463068
562	bookbinders and print finishers	0.466165
670	domestic housekeeper and related occ	0.473684
239	other teaching professionals	0.492958
233	secondary education teaching professionals	0.5
290	psychologists	0.5
661	beauticians and related occ	0.5
290	psychologists	0.5
622	bar staff	0.506536
174	restaurant and catering managers	0.508108
790	merchandisers	0.509804
630	travel and flight attendants	0.514286
270	librarians	0.519481
392	careers advisers and vocational guidance specialist	0.52
862	packers, bottlers, canners, fillers	0.526638
132	civil service executive officers	0.529262
412	debt, rent and other cash collectors	0.529762
363	personnel and industrial relations officers	0.532847
792	telephone salespersons	0.533654
346	medical technicians, dental auxiliaries	0.536364
556	tailors and dressmakers	0.545455
958	cleaners, domestics	0.554407
371	welfare, community and youth workers	0.555256
344	chiropractors	0.555556
420	filing, computer and other records clerks	0.563861
813	winders, reelers	0.566265
293	social workers, probation officers	0.566591
620	chefs, cooks	0.593626
235	special education teaching professionals	0.598639
172	hairdressers' and barbers' managers and proprietors	0.6
791	window dressers, floral arrangers	0.608696
720	sales assistants	0.610572
673	launderers, dry cleaners, pressers	0.619433
954	shelf fillers	0.622378
370	matrons, houseparents	0.628692
410	accounts and wages clerks, book-keepers, other fin clerks	0.637767
621	waiters	0.640351
490	computer operators	0.645788
652	educational assistants	0.658915

Female Intensive Occupations in 1985

fem99=1		
occ	Description	F99/M99
384	Actors, entertainers, stage managers, producers and directors	0.502857
231	Higher and further education teaching professionals	0.50983
463	Radio and telegraph operators, other office communication system operators	0.516949
813	Winders, reelers	0.517241
132	Civil service executive officers	0.52075
124	Personnel, training and industrial relations managers	0.521505
350	Legal service and related occupations	0.527027
490	Computer operators	0.529118
802	Tobacco process operatives	0.529412
191	Registrars and admin of educational establishments	0.535714
345	Dispensing opticians	0.55
952	Kitchen potters, hands	0.553846
271	Archivists and curators	0.555556
233	Secondary education teaching professionals	0.557684
222	Ophthalmic opticians	0.5625
224	Veterinarians	0.566667
641	Hospital ward assistants	0.567568
958	Cleaners, domestics	0.573146
130	Credit controllers	0.585714
127	Company secretaries	0.60515
720	Sales assistants	0.606745
239	Other teaching professionals	0.610465
792	Telephone salespersons	0.618535
392	Careers advisers and vocational guidance specialist	0.623853
371	Welfare, community and youth workers	0.623881
172	Hairdressers' and barbers' managers and proprietors	0.625
722	Petrol pump forecourt attendants	0.628205
790	Merchandisers	0.643836
673	Launderers, dry cleaners, pressers	0.64467
621	Waiters	0.648472
270	Librarians	0.661539
420	Filing, computer and other records clerks	0.663517
491	Tracers, drawing office assistants	0.666667
342	Medical radiographers	0.678571
390	Info officers	0.684685
293	Social workers, probation officers	0.687598
400	Civil service admin officers and assistants	0.688005
346	Medical technicians, dental auxiliaries	0.701149
363	Personnel and industrial relations officers	0.701571
177	Travel agency managers	0.702479
630	Travel and flight attendants	0.704819
411	Counter clerks and cashiers	0.711025
290	Psychologists	0.721312
410	Accounts and wages clerks, book-keepers, other fin clerks	0.722373
235	Special education teaching professionals	0.72973
430	Clerks	0.738433
344	Chiropodists	0.741936
401	Local gov clerical officers and assistants	0.75842
953	counterhands, catering assistants	0.767974

Female Intensive Occupations in 1999

A.4 List of Female Intensive Occupations- All

SOC DESCRIPTION	F75/M75	F85/M85	F99/M99
124 <i>personnel, training and industrial relations managers</i>	0.2	0.27	0.53
127 <i>company secretaries</i>	0.34	0.43	0.61
130 <i>credit controllers</i>	0.33	0.46	0.59
132 <i>civil service executive officers</i>	0.38	0.53	0.53
172 <i>hairdresses' and barbers' managers and proprietors</i>	0.58	0.6	0.63
174 <i>restaurant and catering managers</i>	0.63	0.51	0.49
176 <i>entertainment and sports managers</i>	0.43	0.34	0.39
177 <i>travel agency managers</i>	0.3	0.38	0.71
191 <i>registrars and admin of educational establishments</i>	0.39	0.44	0.54
221 pharmacists/pharmacologists	0.3	0.47	0.47
222 <i>ophthalmic opticians</i>	0.5	0.38	0.57
231 <i>higher and further education teaching professionals</i>	0.23	0.29	0.51
233 <i>secondary education teaching professionals</i>	0.47	0.5	0.56
234 <i>primary and nursery education teaching professionals</i>	0.75	0.78	0.83
235 <i>special education teaching professionals</i>	0.51	0.6	0.73
239 <i>other teaching professionals</i>	0.44	0.5	0.62
241 <i>barristers and advocates</i>	0.5	0.15	0.2
270 <i>librarians</i>	0.5	0.52	0.67
271 <i>archivists and curators</i>	0.39	0.37	0.56
290 <i>psychologists</i>	0.48	0.5	0.73
293 <i>social workers, probation officers</i>	0.54	0.57	0.69
340 <i>nurses</i>	0.87	0.88	0.88
342 <i>medical radiographers</i>	0.82	0.74	0.68
343 <i>physiotherapists</i>	0.79	0.78	0.79
344 <i>chiropodists</i>	0.25	0.56	0.75
345 <i>dispensing opticians</i>	0.34	0.19	0.55
346 <i>medical technicians, dental auxiliaries</i>	0.5	0.54	0.71
347 <i>occupational and speech therapists</i>	0.78	0.84	0.88
349 <i>other health associate professionals</i>	0.47	0.44	0.85
350 <i>legal service and related occupations</i>	0.31	0.3	0.53
363 <i>personel and industrial relations officers</i>	0.41	0.54	0.71
370 <i>matrons, houseparents</i>	0.63	0.63	0.82
371 <i>welfare, community and youth workers</i>	0.56	0.56	0.63
384 <i>actors, entertainers, stage managers, producers and directors</i>	0.2	0.4	0.51
390 <i>info officers</i>	0.47	0.46	0.69
392 <i>careers advisers and vocational guidance specialist</i>	0.38	0.52	0.63
400 <i>civil service admin officers and assistants</i>	0.67	0.73	0.69
401 <i>local gov clerical officers and assistants</i>	0.65	0.7	0.76
410 <i>accounts and wages clerks, book-keepers, other fin clerks</i>	0.58	0.64	0.73
411 <i>counter clerks and cashiers</i>	0.61	0.68	0.72

Female Occupations, Part A

SOC DESCRIPTION	F75/M75	F85/M85	F99/M99
412 debt, rent and other cash collectors	0.52	0.53	0.45
420 filing, computer and other records clerks	0.5	0.57	0.67
421 library assistants/clerks	0.66	0.74	0.84
430 clerks	0.62	0.69	0.74
450 medical secretaries	0.88	0.95	0.98
451 legal secretaries	0.93	0.95	0.99
452 typists and word processor operators	0.94	0.95	0.98
459 other secretaries	0.93	0.94	0.99
460 receptionists	0.85	0.9	0.95
461 receptionists/telephonists	0.83	0.89	0.93
462 telephone operators	0.77	0.83	0.8
463 radio and telegraph operators, other office communication system operators	0.51	0.42	0.52
490 computer operators	0.74	0.65	0.53
491 tracers, drawing office assistants	0.16	0.28	0.67
553 originators, compositors and print finishers	0.87	0.87	0.9
555 show repairers, leather cutters and sewers...	0.48	0.45	0.38
557 clothing cutters, milliners, furriers	0.44	0.46	0.32
559 other textiles, garments and related trades nec	0.42	0.43	0.47
562 bookbinders and print finishers	0.57	0.47	0.38
614 traffic wardens	0.53	0.45	0.33
620 chefs, cooks	0.68	0.6	0.44
621 waiters	0.66	0.65	0.65
622 bar staff	0.47	0.51	0.49
630 travel and flight attendants	0.34	0.52	0.71
640 assistant nurses, nursing auxiliaries	0.9	0.9	0.86
641 hospital ward assistants	0.59	0.68	0.57
644 care assistants and attendants	0.78	0.8	0.87
650 nursery nurses	0.92	0.87	0.98
651 playgroup leaders	0.67	0.28	0.91
652 educational assistants	0.56	0.66	0.9
659 hairdressers, beauticians and related occupations	0.82	0.76	0.96
660 hairdressers, barbers	0.79	0.85	0.84
661 beauticians and related occ	0.6	0.5	0.96
670 domestic housekeeper and related occ	0.62	0.48	0.83
671 housekeepers (non domestic)	0.23	0.43	0.9
673 launderers, dry cleaners, pressers	0.58	0.62	0.65
691 bookmakers	0.46	0.45	0.49
699 other personal and protective service occupations nec	0.41	0.47	0.38

Female Occupations, Part B

SOC DESCRIPTION	F75/M75	F85/M85	F99/M99
720 sales assistants	0.64	0.62	0.61
721 retail cash desk and check-out operators	0.77	0.76	0.85
722 petrol pump forecourt attendants	0.49	0.4	0.63
730 collector salespersons and credit agents	0.61	0.46	0.35
790 merchandisers	0.44	0.51	0.65
791 window dressers, floral arrangers	0.62	0.61	0.83
792 telephone salespersons	0.36	0.54	0.62
802 tobacco process operatives	0.23	0.25	0.53
813 winders, reelers	0.6	0.57	0.52
862 packers, bottlers, canners, fillers	0.51	0.53	0.49
863 weighers, graders, sorters	0.44	0.42	0.36
952 kitchen potters, hands	0.8	0.67	0.56
953 counterhands, catering assistants	0.82	0.74	0.77
954 shelf fillers	0.68	0.63	0.32
958 cleaners, domestics	0.55	0.56	0.58

Female Occupations, Part C

Occupations marked in red are those that became female intensive at some point after 1975. Those in blue are occupations that were female intensive in 1975 (and/or 1985) but not in 1999.

Women are more represented than men among personnel, training and industrial relations managers, credit controllers, civil service executive officers as well as travel agency managers. In addition pharmacists and pharmacologists, ophthalmic/ opticians, and higher and further education teaching professionals are some of the female intensive occupations. It has been argued by different researchers²² that there is a great number of predominantly male jobs that have switched to predominantly female ones²³. This

²²Blau, F., and L. Kahn (2000) and Blau, F, P.Simpson and D.Anderson (1998).

²³Specifically 6 occupations belonging to the first major group, that of managers, have

is verified in the list in the Appendix A.4.

A.5 The Demand for female intensive skills

According to our findings women are indeed more likely than men to have and use communication and organisation skills, which are currently becoming very important in the labour market. At this point we wonder if this is a story that applies equally to all women i.e. treating them as an homogeneous group. We believe that this is not likely to be true and we expect it to differ for different education groups. Differences in the probabilities of men/women using different skills at work might exist even within specific (and well defined educational) groups.

One way to explore this is to repeat the analysis for workers of various education levels. In Table 25 we list the marginal effects of the female dummy for different education groups²⁴. The magnitude of the coefficients is relatively similar for the two lower qualification groups and among the three higher education levels. In particular the marginal effect of the female

switched to female intensive after 1975 (personnel, training and industrial relations managers, company secretaries, credit controllers, civil service executive officers, restaurant and catering managers and entertainment and sports managers). The same holds for ophthalmic opticians and higher and further education teaching professionals as well as archivists and curators among professionals. Furthermore. actors, entertainers, stage managers, producers and directors, careers advisers and vocational guidance specialist and other health associate professional and legal service and related occupations have switched from predominantly male to female in the last two decades.

²⁴QLa stands for qual2, QLb for qual3, QLc for qual4, QLd for qual5-qual8 and QLe for qual9. The reference group is qual1, i.e. no qualifications.

dummy is much smaller in the upper education group. However again there is significant evidence that activities and task that require contact with clients and colleagues are mostly female intensive. Computer use is a female intensive skill, the marginal effect implies that women are 17% to 18% more likely to use computer at work. However this effect drops to 14% for the highly skilled. Advising, counselling and caring for clients and colleagues is also female intensive, with a marginal effect close to 17%. Team working and listening to colleagues is more likely to be done by women the marginal effect being 7%-8% and 8%-11% respectively. On the contrary, analysing complex problems and finding solutions to problems is a male characteristic.

Probit with D=1 if essential, v. important					
	$\hat{\zeta} = (*100)$				
	QLa	QLb	QLc	QLd	QLe
Dealing with people	9.4	6.9	6.6	6.3	4.4
Training, Teaching others	3.4	3.4	3.4	3.3	3.3
Speeches	0	0	0	0	0
Persuading-Influencing	-0.5	-0.6	-0.6	-0.6	-0.5
Selling a product or service	-0.8	-0.8	-0.8	-0.8	-0.8
Counselling, advising caring	17.1	17	16.9	17	16.2
Team work	8.6	7.8	7.2	7.3	7.3
Listening to colleagues	11.2	9.3	8.1	8.9	8.6
Computer use	17	18	18	18.1	14.3
Finding causes of problems	-2.1	-1.8	-1.7	-1.8	-1.6
Solutions to problems	-2.8	2.3	-2.1	-2.2	-1.7
Analysing complex problems	-0.6	-0.7	-0.7	-0.7	-0.5
Planning own activities	3	2.8	2.6	2.3	1.4
Planning others activities	0.3	0.3	0.3	0.3	0.36
Organising own time	9.5	8.6	8	7	3.9
Calculations with adv. techniques	-2.1	-2	-2.3	-1.9	-2.7

Table 25: Marginal Effects for Females by Education Group