

Preliminary and incomplete

**RECENT TRENDS IN OCCUPATIONAL SEGREGATION BY GENDER:
A LOOK ACROSS THE ATLANTIC ^(*)**

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1. INTRODUCTION.

With the increasing trend of female participation rates in the labour market which has taken place in Europe and North-America during the 1990s, the topic of occupational segregation by sex has strongly re-emerged both in the academic literature and in the policy discussion. This growing interest reflects the worry by many authors that occupational segregation by gender may exert a negative influence on male-female wage differentials (see Blau and Khan, 1997) and on the possibility of promotion in careers followed by women. While it is arguable to what extent the occupational composition of male and female employment reflects genuine skill differences or discrimination against women (see Polacheck, 1981), Blau et al. (1998) point out that *“there can be little doubt that the extent of occupational segregation is an important indicator of women’s economic status in the labour market “*

Many explanations exist about the origins of growing trend in female labour market participation. On the demand side, it has been pointed out that firms may have been more willing to hire women due to various factors including: the rise of service sector and the decline of manual/production sector; the development of new technologies allowing firms to substitute male for female workers ; the effectiveness of anti-discrimination policy measures; and, above all, the huge increase of higher education among women, as illustrated by the fact that, in most countries, within the age cohort 25-29 years, the proportion of women with tertiary level of education (i.e. holding a university degree) has nowadays overcome that for men. On the supply side, it has been argued that lower fertility rates, the availability of new household technologies and the emergence of flexible-time work has helped the increase in women’s willingness to enter the labour market.

As for occupational segregation, economic theory again suggests many explanations which can also be appended to the demand and supply sides. On the demand side, discrimination against

women or the employers' perception that women are on average less qualified than men may contribute to segregation. On the supply side, there is the human capital explanation that suggests that since women generally anticipate shorter and less continuous careers and are forced to choose jobs that are compatible with their household tasks due to "societal discrimination", it is in their own interest to take occupations which require smaller human capital investment and have lower penalties for breaks in their careers.

In this paper, we examine the recent patterns of gender occupational segregation in the EU *vis-a-vis* the US. This is particularly interesting for at least two reasons: (i) there has been a noticeable increase of female participation rates in the labour market during the 1990s both in the EU (from 54.8% to 59.5%) and in the US (from 67.8% to 70.7%), and female employment growth (0.9% and 1.9% in the EU and the US, respectively, on an annual average basis) has played a major role in explaining total employment growth (0.4% and 1.5%); and (ii) relative to the US, the literature on the evolution of occupational segregation in the EU is scarce and focuses on the 1980s¹. Indeed, from a European perspective, it is important to emphasise that, despite the existence of common patterns in women's labour force participation trends across the Atlantic, a large proportion of the difference between the employment rates of the US and the EU can still be blamed on the lower female employment rate in the EU (about 14 percentage points lower). This differential can be further broken down into about 10 percentage points due to lower labour market participation and 4 percentage points due to higher unemployment.² Thus, any detailed investigation of future trends in EU labour markets, relative to the US, should pay a great deal of attention to the increasing weight of female employment and the reasons accounting for its

¹ See, *inter alia*, Miller (1987), Rubery and Fagan (1993) and Anker (1998).

²In 1999 employment rates of women of 15-64 years of age were 53.1% in the EU and 67.6% in the US; participation rates were 59.5% and 70.7%, respectively, while unemployment rates were 10.9% and 4.4%, respectively.

different performance across countries. Female participation in the labour market varies across countries not just in terms of magnitude but also in terms of the nature of jobs held by women. Recently, occupational changes brought up by biased technological progress and the higher international integration are changing the relative demand of skilled workers and, therefore, affecting the occupational composition of female employment (see, for instance, Black and Juhn, 2000, for the US). Those occupational changes have accelerated the entry of women into non-traditional female careers with significant economic and social effects both on the distribution of resources within the family and the working of the labour market (see Costa, 2000).

With this motivation in mind, this paper aims at deepening into the analysis of recent trends in the evolution and composition of female employment in labour markets across both sides of the Atlantic, with special emphasis on the implications for occupational segregation. By addressing these issues we hope to help identifying some stylised facts that could guide further research on the contrast between the employment performances of the EU and the US, and the design of employment policies targeted at increasing EU employment. For that purpose, and because our main interest is to highlight the role of education in connection with female participation, we make use of the information on the employment status of women across age cohorts and educational attainments provided by the 1999 *European Labour Force Survey* (Eurostat) for the EU, which facilitates comparisons in that respect across the EU countries, and by the 1999 *Current Population Survey* (March Supplement) for the US. Hence, our analysis pays particular attention to the labour market performance of the youngest female generations relative to other older cohorts, conditioning in all cases on their educational attainments. Unfortunately, homogenous data on workers' employment status, classified by educational attainment, for the Member States of the EU is only available since 1992 (since 1995, in the case

of Austria, Finland and Sweden). The lack of longer time series dictates the choice of a single year, i.e. 1999, as the basis of comparison, hoping to uncover convergence trends by examining whether the EU-US differentials in several dimensions of the labour market decline across age cohorts. Therefore, the implicit assumption that we are forced to make in order to disentangle time trends from cohort effects, in the absence of longitudinal data, is that the latter effects are common in both areas and, hence, that they cancel out when differences are taken between the US and the EU.

Since changes in women's employment status and educational attainments are heavily dependent upon age cohorts, we start in Section 2 by documenting some differences in the composition of female labour force and employment between the US and the EU countries, distinguishing by age and education. In Section 3, we examine the occupational structure of female employment and its adjustment to the occupational changes which have taken place over the last decade. Section 4 deals with the differences in the evolution of occupational segregation, across age cohorts and educational levels, paying particular attention to their connection with the gender wage gap and other labour institutions. Finally, Section 5 contains some final remarks and a few policy implications which can be drawn from our analysis.

2. FEMALE EMPLOYMENT BY EDUCATION AND AGE

As pointed out in a companion paper (see Dolado et al., 2001), to better understand the role of women in explaining the employment rate differential between the EU and the US, it is convenient to start by decomposing that differential in the following way:

$$e^{US} - e^{EU} = \sum_i \mathbf{a}_i^{US} e_i^{US} - \sum_i \mathbf{a}_i^{EU} e_i^{EU} = \sum_i e_i^{EU} (\mathbf{a}_i^{US} - \mathbf{a}_i^{EU}) + \sum_i \mathbf{a}_i^{US} (e_i^{US} - e_i^{EU}) \quad (1)$$

where e^{EU} and e^{US} are the aggregate employment rates in the EU and the US, respectively, and e_i and \mathbf{a}_i are the employment rate and the weight in total population of group i , distinguishing between gender, age (15-24, 25-54, and 55-64), and education (tertiary education, –i.e., university- and less than tertiary education). According to the above decomposition, the overall employment rate differential between the US and the EU can be decomposed into two components: i) a *population composition effect*, due to differences in population weights between both areas, holding employment rates equal at the EU levels, and ii) an *employment incidence effect*, due to differences in employment rates, holding population weights at the US levels. The results of this decomposition are presented in Table 1.³ The first two panels of Table 1 provide direct comparisons of the population shares and the employment rates across groups, while the last two panels list the proportion of the overall differential which is attributed to each group. The main result is that 70% of the employment rate spread arises from the population composition and employment incidence effects attributable to women. More specifically, a closer look at the individual contributions of the different groups indicates that the two main sources of the employment spread are: i) the lower proportion of women 25-54 years of age with tertiary education in the EU relative to the US (6.5% vs. 9.6%, respectively) which accounts for 22% of the total spread, and ii) the lower employment rate of women 25-54 years of age with less than tertiary education in the EU relative to the US (60% vs. 71%) which explains 24.1% of the spread.⁴ In other words, if the EU were to have both the same population weight of highly-

³The EU figures exclude Ireland since data on the educational attainment of the female population were not made available by EUROSTAT.

⁴ These results do not depend qualitatively on the choice of the benchmark employment rates or population weights. Had we chosen an alternative decomposition with the employment rates of the US and the population weights of the EU as benchmarks, then the population composition effect of women aged 25-54 with a university degree and the employment rate effect of women of the same age with less than tertiary education would have accounted for 22.1% and 24.9% of the difference of the employment rate between the US and the EU.

educated women aged 25-54 years old as the US and an identical employment rate of less educated in the same age bracket, then the current difference of 11 percentage points between the US and the EU employment rates would be halved.⁵

Dolado et al. (2001) argue that the fact that the population weight of women aged 25-54 with a tertiary level of education is 3.1 percentage points lower in the EU than in the US (see Table 1) cannot be accounted by the youngest generation since, after all, there has been a significant skill upgrading of the female labour force in the EU over the last two decades. Thus, the higher population weight of highly educated women aged 25-54 in the US should mainly arise both from demographic and educational differences related to the older cohorts in such a broad age group. In effect, the proportion of women aged 35-54 years in the working age population (16-64 years of age) is about 1.8 percentage points higher in the US and the differences in educational attainments are highest in the 45-54 age group, where the proportion of female graduates is 11 percentage points lower in the EU. The difference in the population weight may be interpreted as a reflection of the fact that the peak of the baby-boom took place about a decade earlier in the US than in the EU,⁶ implying the existence of a higher proportion of the US population in the age group with higher attachment to the labour market (25-54 years of age). As for the difference in higher education, there is evidence that the educational upgrading of the labour force started much earlier in the US than in the EU. At the individual country level, there are the Scandinavian countries, with educational qualifications higher than in the US for almost all age cohorts and, at the other end of the spectrum, there are countries like Austria,

⁵ The lower employment rates of youths and older workers (55-64) with less than tertiary education explains roughly the other half of the employment rate differential. Educational and pension systems, respectively, are the main institutions affecting the employment rates of these two groups.

⁶ There is however another reason for this difference based on the age composition of the working age population. That population excludes the prison population that is significantly higher in the US, especially in the case of middle aged males.

Germany and the South-Mediterranean countries. In the case of the first two countries, the higher-education deficit can be accounted by the prevalence of the dual vocational system of education at the transition from school to work, whereas in the remaining countries, women have lower educational attainments than in the US, though for the youngest cohort, the differential is smaller and, in some cases, even negative.⁷

As regards the lower employment rates of women aged 25-54 years old with less than a tertiary level of education, the overall pattern is similar to that earlier obtained for the difference between population weights, i.e., a smaller differential for the youngest cohort and a wide dispersion across EU countries. On the one hand, the Nordic countries enjoy higher employment rates than those of the US. On the other, there are the Southern European countries that have employment rates about 20 (for the younger cohort) and 30 percentage points (for the older cohorts) lower than the corresponding ones for the US.

In sum, the joint picture which can be drawn from the evidence discussed in this section is broadly speaking one of decreasing differentials between the US and the EU as regards both the population weight of highly educated women and the employment rate of the less educated ones. Despite the existence of noticeable variation across the EU countries and that significant overall differences still remain nowadays, it can be concluded that the youngest female generations in the EU are getting closer to their US counterparts both in terms of education and employability, although they seem to be converging much faster in the former dimension than in the latter⁸.

⁷Goldin (1999) and Goldin and Katz (1997, 1999) have documented the increase of the educational attainments of the US population during the 20th century. This educational upgrading of the labour force has also taken place in the EU, although in some countries took place much later than in the US. For instance, in 1940 roughly 50% of the US youths already had a medium level of education -High School diploma, whereas the corresponding proportion for some EU countries was around 20% (see Costa, 2000).

⁸ Differences in employment rates across age cohorts within a given country can be either due to cohort effects or to time trends. However, insofar as the cohort effect is similar in the EU and in the US, a reduction in the employment

2. THE OCCUPATIONAL COMPOSITION OF FEMALE EMPLOYMENT.

There are reasons to believe that female employment rates depend heavily on the overall occupational structure of employment and the possible existence of segregation by gender. In what follows we examine each of the two issues in turn by performing some further comparisons between the US and the EU.

As for the occupational structure of female employment, we consider 10 occupational groups: professionals, non-manual low-skill occupations, and manual occupations in agriculture, manufacturing and utilities, private services and social services.⁹ Table 2 reports the proportion of women of a given age and educational attainment level employed in each of those occupational groups. As reported in the Table, the main differences between the US and the EU lie in: i) the smaller weight of female employment in private services in the EU (being these differentials larger for women with lower levels of education); and ii) the larger employability of less educated women into non-manual low skill jobs in social services in the US. This last fact may just reflect the smaller availability of low productivity jobs both in private and social services in the EU due to the existence of wage floors implied by various labour market regulations. By contrast, the only occupations in which the proportion of women employed is significantly higher in the EU than in the US are professional jobs in social services for women with a tertiary level of education, especially for the cohort aged 35-54. This fact can be rationalised in terms of the larger size of the public sector in the EU. However, these patterns are bound to change in the future as reflected by the growing share of younger female employment in private services both in the EU and in the US. In this respect, it is noteworthy that the rate at which highly educated

rate differential across age cohorts can be interpreted as a sign of convergence. Arguably, the cohort effect varies across countries but it is unlikely that this variation could entirely explain that reduction. Since data disaggregated by educational attainment are not available for all EU countries before 1992, we cannot disentangle the cohort effect and the time trend for each area separately.

young women are getting jobs in the private service sector, relative to the older generations, is higher in the EU than in the US, as indicated by the higher difference across age cohorts in the proportion of women with tertiary education holding jobs in the private service sector. Hence, if that pattern were to remain in the next decade or so, the differential is bound to disappear. This is not the case, however, for the employment shares of women with less than tertiary education in both private and social service sectors, where differentials across age cohorts remain roughly constant between the US and the EU. By contrast, the rate at which young highly educated women are holding jobs in the social service sector is almost identical in both areas, having converged to about 38% .

Table 3, in turn, offers detailed information on the differences between the US and EU countries regarding the four occupations for which we observed larger discrepancies in Table 2. With regard to the employment of highly educated women in professional jobs in private services, the EU countries which look closer to the US are Austria, the Netherlands and the UK, albeit only for the youngest cohort , whilst the Southern Mediterranean countries are again those who fare worst in this dimension. The remaining countries show both sizeable differences with the US and no significant patterns of a reduction across age cohorts. In contrast to private services, highly educated women in the EU have traditionally had larger employment opportunities in professional jobs in social services, particularly in the case of some Nordic countries, Austria, the Netherlands and Portugal. Nonetheless, the differences at the EU level for the youngest cohort have almost vanished and there are even four countries (Finland, France, Italy and Spain) with a lower proportion of highly educated young women employed in this sector than in the US. With regard to the employment patterns for women with lower levels of education, we observe steady differentials across age cohorts in both the private and the social

⁹ Given the small incidence of agricultural employment we have grouped the three occupations in this sector.

service sector. Only the UK, in both cases, France plus some of the Scandinavian countries, in the case of the social service sector, and Austria, in the case of the private service sector, show a larger female employment share than the US. In this respect, it should be remarked that the distinction between private and social services in the EU is very much related to the distinction between private and public service sectors and, hence, differences in the pay determination system in both sectors (which are almost negligible in the US) could be at the root of the varying employment opportunities of less educated women. However, within the EU there is no clear pattern with regard to either public-private differentials or to wage dispersion within sectors, which may be the reason for the variety of individual country experiences observed in Table 3.¹⁰

4. TRENDS IN OCCUPATIONAL SEGREGATION .

Since the 1980s, biased technological progress and globalisation have increased the demand of skilled labour both in the US and in the EU. To the extent that women experienced a more intense skill upgrading than men, this has favoured female employment. Occupational changes have also tended to increase employment in “typical” female occupations (e.g. services) and to reduce employment in “typical” male occupations (manual/production jobs). Moreover, the entry of women into “careers” makes them more prone to succeed at “typical” male occupations. Both changes in the occupational mix of employment and changes in the sex composition of each occupation have resulted into a reduction of occupational segregation by gender (i.e., the tendency for women to work in different occupation than men)¹¹ during the 1980s. In order to check if this decline in occupational dissimilarity by gender has continued at a

¹⁰On public pay determination systems in the EU, see Elliott et al. (1999).

¹¹See, for instance, Blau, Simpson, and Anderson (1998) and Costa (2000) for the US during the 1970-90 period, and Anker (1998) for EU countries during the 1980s.

similar rate in the US and in the EU over the 1990s we compute the widespread-used Duncan and Duncan (1955) index of segregation (S_t) for 1999, distinguishing by age cohorts and educational attainments. This index is defined as follows:

$$S_t = \frac{1}{2} \sum_i |m_{it} - f_{it}| \quad (2)$$

where m_{it} (f_{it}) is the proportion of the male (female) labour force employed in occupation i at time t .¹² This index, expressed as a percentage, can be loosely interpreted as the proportion of women (or men) who would have to change occupations for the occupational distribution of men and women to be the same. A value of 0% indicates that the distribution of women across occupations is the same as that of men, while a value of 100% indicates that women and men work in completely different occupations. To construct comparable indices across the US and the EU countries, we consider 108 occupations by combining 9 occupational groups and 12 industrial sectors.¹³

Table 4 lists occupational segregation index by age cohort and education in the US and its difference with respect to the EU and its Member States. We observe higher occupational segregation by gender in the EU than in the US (particularly for highly educated women aged 35-44). In both areas, segregation has declined across age cohorts for the female workers with higher education, while it has remained more or less stable for the less educated ones. The EU countries appear to be very different in this regard, with the Scandinavian countries and, to a lesser extent,

¹²This index is not additively decomposable, so that segregation indexes over different age cohorts do not add up to the overall segregation index by gender. An alternative additively decomposable index is proposed in Mora and Ruiz-Castillo (2000).

¹³The occupations considered are: 1. Executives, officials and managers, 2. Professionals, 3. Technicians and associate professionals, 4. Clerical personnel, 5. Sales and service workers, 6. Craft and related trade workers, 7. Manual workers, 8. Elementary occupations, 9. Agricultural workers. The industrial sectors are: 1. Agricultural, hunting and forestry, 2. Mining and quarrying, 3. Manufacturing, 4. Electricity and other utilities, 5. Construction, 6. Wholesale trade, and personal and social services, 7. Transportation, 8. Finance and Real State, 9. Public Administration, 10. Education, 11. Health and social work, and 12. Household and domestic services.

Austria and Germany showing the highest levels of occupational segregation, while the Southern European countries have levels of segregation closer to those in the US. Both results are in agreement with the evidence contained in Anker (1998) and Rubery and Fagan (1993), using a much finer occupational classification. The reason why occupational segregation by gender is highest in Nordic countries comes mainly from their unusually high weight of female employment in female-dominated occupations such as education, health care, and some social services (such as child-care minders and other care-givers) which, on the other hand, help to support the high labour market participation of women in these countries (see Anker, 1998). In turn, the low level of segregation in the Mediterranean countries (especially Greece and Italy) can be interpreted in terms of the relative scarcity of occupations which are traditionally either male or female dominated, such as professionals in private and social services.

In order to improve our understanding of the observed changes in the segregation index across the three age cohorts, we follow Blau et al. (1998) in decomposing the change in the segregation index between two age cohorts into: (i) a “sex composition effect” within occupations, holding the size of occupations constant, and (ii) an “occupation mix effect” due to changes in the occupational mix of the economy, holding sex composition within occupations constant. Denoting by M_{ic} (F_{ic}) the number of males (females) in occupation i and cohort c , then total employment in occupation i and cohort c is $T_{ic} = M_{ic} + F_{ic}$ and the segregation index in (2) can be rewritten as:

$$S_c = \frac{1}{2} \sum_i |(q_{ct} T_{ct} / \sum q_{ct} T_{ct}) - (p_{it} T_{ct} / \sum p_{ct} T_{ct})| \quad (3)$$

where $q_{ic} = M_{ic} / T_{ic}$ and $p_{ic} = F_{ic} / T_{ic}$ are the proportion of men and women in each occupation, respectively. Then, denoting by S_{ks} the segregation index with gender weights q and p computed

for cohort k , and occupation-size weight T computed for cohort s , with $k,s=0,1$, it is immediate to check that:

$$S_{11} - S_{00} = (S_{10} - S_{00}) + (S_{11} - S_{10}) \quad (4)$$

where the first term in the right-hand-side of (4) is the “sex composition effect”, namely, the change in the index between cohorts 1 and 0 that would have occurred if the size of each occupation had remained fixed at its level for cohort 0, and the second term is the “occupation fixed effect”, that is, the change in the index if the sex composition had remained fixed at the level for cohort 1.

Tables 5 a and b report the results of the previous decomposition, distinguishing between the two levels of education, where cohorts 0 and 1 are the age groups 25-34 and 35-44, 35-44 and 45-54, and 25-34 and 45-54, respectively. They indicate that the “sex composition effect “ has played a major role in explaining the reduction of the index across age cohorts. For example, in the case of highly-educated women aged 25-34 versus the 35-44 group, the index declined by 4.6 percentage points in the US (from 36.0 to 31.4) out of which the “sex composition effect” explains 85% of the fall. Likewise, that effect explains 91 % of the decrease of 5.7 percentage points in the EU. This result remains valid for the other comparisons both in the US and the EU, though it is noteworthy that, for the two older age cohorts in the EU, the “occupational mix effect” has moved towards increasing the segregation index, opposite to what has happened in the US. It is interesting to notice that the comparisons across age cohorts in the US are not too different from the results that Blau et al. (1998) report using Census data for 470 detailed occupations in 1970,1980 and 1990. Without distinguishing by educational attainment, they obtain that the “sex composition effect” explains 68% of a decline of 6.3 percentage points in the index during the 1980s, whereas our comparison of the 35-44 and 45-54 age cohorts, yields a

contribution of 76% and 77% for highly-educated and less-than-highly educated women, respectively. The similarity between the two contributions seems to support the view that the distorting effects of mixing the cohort effects and the time trends in our analysis are not too important.

Given the previous results about the importance of the “sex composition effect” in explaining the reduction in occupational segregation across age cohorts, an important issue is whether the shift in the sex composition of occupations represent shifts in female or male employment. Tables 6 a and b present the distribution of female workers in occupations, again distinguishing by educational attainment, in occupations which have been previously defined as “male”, “integrated” and “female”, where a “male” (“female”) occupation is one where $p_{ic} \leq (P_c -.10)$ ($p_{ic} > (P_c +.10)$) and “integrated” jobs are the rest. In the US, we observe that there has been a clear shift from “female” to “integrated” occupations, for both educational attainments, as we move from older to younger age cohorts, and that, with the exception of the youngest graduates, the proportion of women working in “male” jobs is larger than in the EU. By contrast, in the EU, there is a clear shift from “female” occupations to both “integrated” and “male” jobs for female graduates (especially in some of the Nordic countries, the Netherlands and the U.K), and a much smaller shift from “female” to “integrated” jobs for less-educated women. This in agreement with the diagnosis made in section 3 about the lower employability of that type of EU female workers in the services sector.

Finally, we carry out some regression analysis to uncover possible correlations between the segregation indices, by country and age cohort, and a number of variables which have been discussed in the literature as potentially correlated with the level of occupational segregation. Among those variables, we focus on the proportion of part-time jobs in female employment and

the gender wage gap. It has been argued elsewhere (see, e.g., Rubery and Fagan, 1993) that there might be a positive correlation between that proportion and the level of occupational segregation by sex since many women, after an interruption in their working careers due, for example, to maternity leave, end up in part-time jobs and, therefore, occupations prone to part-time work turn out to be mainly “female” with the corresponding increase in occupational segregation by gender. As for the second variable, causation could go in both ways. On the one hand, if segregation is the result of discrimination, then the correlation between the level of segregation and the gender wage gap should be positive¹⁴. On the other hand, if employers think that men are more productive than women, for a given educational level, then they may be ready to hire the latter in typically “male” jobs if they can pay them a lower salary, leading to a negative correlation. To address those issues, we estimate a descriptive regression model with 45 observations corresponding to the level of the segregation index, by country (15) and age cohorts (3). As mentioned before, we use the proportion of female part-time jobs (PT) and the gender wage gap (WG) as explanatory variables. To construct the latter variable, we use individual wage-data information from the *European Household Panel Survey* (1996) and the *Current Population Survey* (1998) for workers with full-time jobs, and estimate 12 Mincerian wage equations for each country (6 for each gender, where each equation has been estimated for an age cohort (3) and an educational level (2)). The controls in each earning equation have been the following: four dummies for seniority (0-2, 3-5, 6-10 and above 10 years in the firm), one dummy for civil status (married), nine dummies for occupation, three dummies for sector, a dummy for public sector, job experience, and firm size. The well-known Oaxaca-Blinder decomposition has been then used to split the total wage gap into a component due to differences in skills/characteristics and other due to discrimination. Only the latter will enter the equation as a explanatory variable.

¹⁴ See Bergman (1974)

Before commenting on the estimated relationship between segregation and the two above-mentioned variables, a brief discussion of the results regarding the gender differentials in pay is worthy. Tables 7.a and b list the total male-female wage differentials and their two components in the Oaxaca-Blinder decomposition (namely, the differential due to *characteristics* and that due different market returns for the same characteristics, i.e., *discrimination*) by age cohorts and educational attainments. In the case of workers with tertiary education, Table 7.a shows that the total gender wage gap has been declining in both the EU and the US across age cohorts and that it has been quite higher in the EU than in US except for the youngest cohort. This decreasing trend accords well with the available evidence for the US¹⁵ where despite a rising overall wage inequality during the 1980s and the first half of the 1990s, the male-female pay gap has been falling. That feature, according to Blau and Khan (1997), can only be explained if women's skills and/or the treatment of women improved sufficiently to offset the negative effects of trends in the overall wage structure. As for the role of *characteristics* and *discrimination* in explaining the gender wage gap, the role of the latter seems to be much more important than that of the former. With regard to the less-educated workers, the gender wage gaps reported in Table 7.b show a decreasing pattern across age cohorts for both areas and tend to be lower in the EU, in agreement with the less dispersed wage distribution prevailing there. It is also worth noticing that the total gender wage gaps are larger for the less-educated workers than for graduates and that, the weight of the *discrimination* component is much higher than that of the *characteristics* component. When considering the individual Member States of the EU we tend to observe lower gender wage gaps in the Scandinavian countries, Belgium and the Netherlands and the highest one in Austria.

¹⁵ See Katz and Murphy (1992), Juhn et al. (1993).

The results of the estimated equation explaining segregation are reported in Table 8 where we use dummy variables by education and by age as further controls. The reference group are those aged 45-54 with lower education. The estimation method is Weighted Least Squares, where each observation has been weighted by the inverse of the square root of the size of the occupation in each age cohort/education cell. As may be seen in the first column of Table 7, there is a slightly significant positive effect of PT on the segregation index which agrees with the interpretation given above. However, the WG variable does not appear statistically significant. Since there might be an endogeneity bias problem, due to the inverse causality running from segregation to gender pay gap, we report in the second column of Table 7 the estimates obtained when WG is instrumented by the gender wage gap due to differences in skill, without achieving a significant coefficient either. However, the positive estimated coefficient on WG may be interpreted as giving some weak support to the view that women are crowded in low-paid occupations. Therefore, overall we can observe that the youngest age cohort and the most educated women have a lower segregation index, and that the proportion of part-time jobs in the economy tends to increase the level of occupational segregation by sex.

5.CONCLUDING REMARKS

In this paper, we have examined to what extent the patterns observed for female employment status in the EU and the US are looking more similar over time. Due to the lack of sufficiently long time series in the EU regarding a common detailed occupational classification by age and education in the different Member States of the EU, we have opted for the use of a single cross-section of data, as of 1999, trying to uncover convergence patterns across different dimensions of the female labour market between both sides of the Atlantic. To do so we proceed by comparing the US-EU differences of various labour market outcomes for three age cohorts (25-34, 35-44 and 45-54) and two educational levels (tertiary and less-than-tertiary education). To the extent that cohort effects are not too different between both areas, those differences will give us a not too inaccurate picture of how female workers are catching up with their US counterparts in terms of labour market participation, job composition, wage gap with respect to male workers and occupational segregation.

We have estimated that as much as half of the difference in the aggregate employment rates between the US and the EU can be attributed to the educational composition and the employment status of women aged 25-54. By analysing the differences in education and employment rates across the above-mentioned different age cohorts and educational attainments for that group we have been able to document the following facts:

- i) The population weights of highly educated women in the EU is slowly converging to those of the US by the ageing of the baby boom generation in the US and the increase of educational attainments of the youngest generation of women (25-34) in most EU countries.

- ii) By contrast, the employment rates of less educated women are much lower in the EU than in the US (with the exceptions of the Scandinavian countries) even for the youngest generation. Thus, convergence in this dimension is likely to be much slower.
- iii) The occupational structure in both areas is dissimilar, with European women having a larger share of employment in social services, while North-American women have a larger employment share in private services. However, the rate at which highly educated young women are getting jobs in the private services sector, relative to older cohorts, is higher in the EU than in the US.
- iv) In both areas, occupational segregation has been declining across age cohorts in the case of female graduates and has remained steady for those with lower educational attainment. In particular, the level of segregation for the former group still larger in the EU than in the US.
- v) Occupational segregation seems to be positively correlated with the share of part-time jobs in the economy, in the sense that part-time jobs tend to be typically “female” occupations. It is also negatively correlated with age and education.
- vi) The gender wage gap has been declining in both the EU and the US and it seems that the discrimination component is the most important one in explaining the male-female wage differential. However, the correlation between the level of occupational segregation and the gender gap in pay is weak.

The results above could help to shed light on some of the policy issues concerning one of the primary policy goals of the EU governments, that is, to achieve a larger employment rate during the current decade. At the Lisbon’s summit held in June 2000, EU governments pledged

to reach an employment rate target of 70% by the year 2010. Our previous findings indicate that the introduction/extension of policy measures favouring equal opportunities in the labour market (such as tax incentives for dual earners couples, child allowances, lower Social Security contributions for replacement of women under maternity leave, equal social rights of part-time workers, flexible work-time arrangements) in conjunction with the educational drive which younger female cohorts are undertaking should be key in achieving such a target. This has been recognised by policy-makers, to some extent, as shown by the fact that under the Luxembourg process, launched in November 1997, which co-ordinates employment policies across EU countries, equal opportunities in the labour market were one of the four pillars to which national employment policies should be targeted.

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TABLE 1
Decomposition of the difference in aggregate employment rates between the US and EU⁽¹⁾, 1999.

Age/ Educational attainment	Population Weights (%)				Employment Rates (%)				Contribution of differences in population weights (2)		Contribution of differences in employment rates (2)	
	EU		US		EU		US		Males	Females	Males	Females
	Males	Females	Males	Females	Males	Females	Males	Females				
16-24 years of age												
<i>Tertiary level</i>	0.5	0.7	0.4	0.7	57.7	55.5	84.7	85.5	-0.5	-0.3	1.0	1.7
<i>Less than tertiary level</i>	8.7	8.5	9.3	9.0	40.8	33.3	56.7	53.8	2.2	1.4	13.1	16.4
25-54												
<i>Tertiary level</i>	7.2	6.5	9.6	9.6	92.1	82.3	93.5	82.8	19.4	22.0	1.2	0.4
<i>Less than tertiary level</i>	25.0	25.7	23.5	24.9	84.4	60.0	85.4	71.0	-11.7	-4.3	2.1	24.1
55-64												
<i>Tertiary level</i>	1.4	0.8	1.7	1.3	63.5	52.2	78.7	61.9	1.6	2.4	2.3	1.1
<i>Less than tertiary level</i>	6.9	8.0	4.6	5.6	43.8	24.6	61.9	47.7	-9.1	-5.2	7.3	11.4
TOTAL	49.8	50.2	49.0	51.0	71.4	52.6	79.1	67.6	1.9	15.9	27.0	55.2

(1) EU-15, excluding Ireland. (2) Measured as the % of the difference in aggregate employment rates between the US and the EU

Notes: Tertiary level of education: ISCED 5-7.

Sources: European Labour Force Survey (1999) and Current Population Survey (March Supplement, 1999).

TABLE 2
Occupational structure of female employment by age cohorts and educational levels, 1999
(% of female population of each group employed in each occupation)

	Tertiary level						Less than tertiary level					
	EU			US			EU			US		
	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54
Agricultural sector	0.5	0.7	0.6	0.5	0.7	0.9	1.6	2.5	2.9	0.8	1.5	1.1
Manufacturing and Utilities	8.5	5.9	4.1	8.3	7.8	5.7	11.5	10.8	9.5	10.0	11.5	11.6
<i>Professionals</i>	5.6	4.2	2.6	6.2	5.8	3.9	1.8	1.6	1.5	1.8	2.6	2.6
<i>Non manual low-skill</i>	2.0	1.2	1.0	1.1	1.2	1.1	3.5	3.3	3.1	2.8	2.9	2.8
<i>Manual occupations</i>	0.9	0.5	0.5	1.0	0.8	0.7	6.2	5.9	4.9	5.4	6.0	6.2
Private services	31.2	22.3	16.8	35.0	30.0	23.7	31.3	28.7	25.7	39.2	37.0	33.6
<i>Professionals</i>	19.6	15.7	11.7	25.6	21.8	16.8	6.9	6.6	6.2	12.0	12.4	11.3
<i>Non manual low-skill</i>	10.7	6.0	4.5	8.1	7.1	5.9	19.8	16.5	14.1	22.5	18.9	17.3
<i>Manual occupations</i>	0.9	0.6	0.6	1.3	1.1	1.0	4.6	5.6	5.4	4.7	5.7	5.0
Social services	38.6	54.1	59.5	38.2	43.4	54.3	15.0	19.6	17.8	19.0	22.9	24.7
<i>Professionals</i>	34.1	48.9	57.0	33.5	39.0	49.2	6.0	7.0	6.2	7.4	8.3	9.6
<i>Non manual low-skill</i>	4.3	5.0	4.2	4.5	4.1	5.0	7.5	10.1	8.9	10.7	13.0	13.3
<i>Manual occupations</i>	0.2	0.2	0.3	0.2	0.3	0.1	1.5	2.5	2.7	0.9	1.6	1.8
Total	78.8	83.0	81.0	82.0	81.9	84.6	59.4	61.6	55.9	69.0	72.9	71.0

Notes: Manufacturing and Utilities = Mining and quarrying, manufacturing, electricity, gas and water supply and construction; Social Services = public administration, education, health and social work; Private services: all other services. Professionals = Managers, professionals, technicians and associate professionals; Non manual low-skilled = clerks, service workers, shop and market sales workers. Manual Occupations = craft and related trades workers, operators and elementary occupations.

Sources: European Labour Force Survey (1999) and Current Population Survey (March supplement. 1999).

TABLE 3
Occupational structure of female employment: Differences between the US and the EU, 1999 (%)

	Professionals in private services (Tertiary level of education)			Professionals in social services (Tertiary level of education)			Non manual low-skill in private services (Less than tertiary level of education)			Non manual low-skill in social services (Less than tertiary level of education)		
	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54	25-34	35-44	45-54
EU	6.0	6.1	5.1	-0.6	-10.0	-7.9	2.7	2.4	3.2	3.2	3.0	4.4
Denmark	8.2	13.0	7.7	-12.8	-25.7	-20.5	3.1	4.0	2.6	-8.1	-12.8	-9.8
Finland	8.2	5.5	-0.2	2.2	-1.8	-0.8	6.1	4.0	1.6	3.9	0.7	1.1
Sweden	6.4	3.5	3.3	-4.0	-17.1	-17.8	2.7	2.5	2.0	-12.8	-18.8	-15.1
Austria	2.7	7.5	4.3	-19.8	-22.5	-15.5	-5.8	-2.6	-0.6	6.3	8.1	10.0
Germany	7.2	5.7	4.5	-5.2	-4.5	-1.2	2.5	0.5	-0.4	4.9	6.5	7.4
Belgium	6.7	7.4	8.9	-6.1	-12.1	-6.4	1.7	1.0	6.5	-1.1	0.9	6.0
France	4.7	3.4	1.8	2.5	-8.6	-6.7	2.1	1.2	2.5	-1.6	-2.3	-0.2
Netherlands	-1.8	6.3	4.2	-10.3	-11.9	-9.4	3.1	4.3	6.6	2.0	3.3	3.8
Greece	6.7	1.8	0.3	-6.2	-13.6	-2.7	4.6	6.6	10.6	7.1	6.9	9.8
Italy	8.4	6.8	9.0	6.3	-15.1	-14.5	6.6	6.0	7.5	7.7	7.1	9.2
Portugal	8.9	7.8	7.6	-23.4	-32.4	-26.3	1.7	5.3	6.8	4.3	3.6	4.7
Spain	11.8	11.3	9.2	12.1	-6.4	-4.9	4.4	8.8	10.4	7.0	8.0	9.7
UK	1.3	5.6	6.3	-3.9	-12.0	-10.3	-1.2	-3.1	-3.7	0.0	-2.4	-1.9

Sources: European Labour Force Survey (1999) and Current Population Survey (March supplement, 1999).

TABLE 4
Segregation index, 1999 (%)

	Tertiary level of education			Less- than- tertiary level of education		
	25-34	35-44	45-54	25-34	35-44	45-54
US	31.4	36.0	42.3	49.6	49.1	50.9
Differences between the US and the EU						
EU	-3.8	-4.9	0.4	2.7	0.5	2.7
Denmark	-13.1	-20.4	-11	-0.5	-8.2	-7.1
Finland	-12.9	-15.2	-7.8	-0.7	-9.6	-7.6
Sweden	-15	-13	-7.3	0.5	-11	-12.4
Austria	-7.5	-8.1	-4.8	-3	-3.4	-1.2
Germany	-9.7	-8.3	-1	-1.6	-2.5	1.6
Belgium	-3.7	1.4	-1	-4.9	-6.6	-5.4
France	-4.3	-3.1	2.8	-2.5	-3.4	-0.7
Netherlands	-1.7	-2.5	10	0.3	-7.3	-3.6
Greece	-1	2.8	10.5	6.1	6.3	6.2
Italy	1.1	1.7	-3.8	9.8	8.8	9.5
Portugal	-5	-6.2	-0.5	6.1	1.9	2.7
Spain	-5.6	-7.1	-7.2	-0.6	1.9	-0.8
UK	-3.9	-11.6	-8.8	-0.3	-7.6	-6.9

Sources: European Labour Force Survey (1999) and Current Population Survey (March supplement, 1999).

TABLE 5a
Differences in segregation indexes between age cohorts
Tertiary level of education, 1999 (%)

	Sex composition			Occupational mix		
	25-34/ 35-44	35-44/ 45-54	25-34/ 45-54	25-34/ 35-44	35-44/ 45-54	25-34/ 45-54
US	-3.9	-4.8	-9.1	-0.7	-1.4	-1.8
EU	-5.2	-2.1	-7.5	-0.5	1.2	0.8
Denmark	-6.4	-2.1	-8.1	-5.5	5.1	-0.7
Finland	-4.3	-3.0	-5.5	-2.6	4.1	-0.4
Sweden	-2.2	-5.0	-6.3	-0.4	4.4	3.1
Austria	-6.3	-7.9	-14.2	1.0	4.9	6.0
Germany	-2.7	0.5	-2.0	-0.5	0.5	-0.3
Belgium	-0.2	-9.0	-7.6	0.7	0.3	-0.7
France	-3.3	-4.0	-6.9	-0.1	3.7	3.2
Netherlands	-2.1	3.0	3.1	-3.3	3.2	-2.3
Greece	-2.6	-0.7	-1.4	1.8	2.2	2.1
Italy	-1.8	-9.6	-9.2	-2.2	-2.2	-6.6
Portugal	-4.8	-1.6	-5.2	-1.0	1.1	-1.1
Spain	-7.4	-5.0	-12.6	1.3	-1.4	0.2
UK	-11.2	-4.9	-15.8	-1.2	1.4	-0.1

Sources: European Labour Force Survey (1999) and Current Population Survey (March supplement 1999).

TABLE 5b
Differences in segregation indexes between age cohorts
Less than tertiary level of education, 1999 (%)

	Sex composition			Occupational mix		
	25-34/ 35-44	35-44/ 45-54	25-34/ 45-54	25-34/ 35-44	35-44/ 45-54	25-34/ 45-54
US	1.3	-1.4	-0.2	-0.8	-0.4	-1.1
EU	-1.0	-0.3	-1.3	-0.7	0.8	0.0
Denmark	-5.4	0.5	-3.8	-1.7	-1.2	-4.1
Finland	-4.3	1.2	-4.9	-4.1	-1.0	-3.3
Sweden	-5.7	-4.9	-8.7	-5.3	1.7	-5.5
Austria	-1.3	0.5	-1.9	1.4	-0.1	2.5
Germany	-0.4	0.2	-0.1	-0.1	2.2	2.1
Belgium	-0.1	-2.6	-2.9	-1.1	2.0	1.1
France	1.1	-0.9	0.5	-1.5	1.8	-0.1
Netherlands	-5.6	3.0	-3.2	-1.5	-1.0	-2.0
Greece	2.1	-3.9	-2.7	-1.4	2.0	1.5
Italy	2.3	-1.1	1.2	-2.8	0.0	-2.8
Portugal	-3.2	-3.5	-7.7	-0.5	2.5	3.0
Spain	2.2	-5.8	-4.1	0.8	1.3	2.6
UK	-5.8	-0.8	-6.3	-1.0	-0.3	-1.6

Sources: European Labour Force Survey (1999) and Current Population Survey (March supplement 1999).

TABLE 6a
Distribution of workers by sex composition of occupational category by age cohorts
(Tertiary level of education, 1999)

	25-34			35-44			45-54		
	Male	Integrated	Female	Male	Integrated	Female	Male	Integrated	Female
US	17.1	31.1	51.8	20.5	24.3	55.2	21.3	15.6	63.1
EU	20.5	24.4	55.2	17.2	18.7	64.1	14.6	14.1	71.3
Denmark	20.2	30.9	48.9	11.9	30.3	57.8	11.5	36.8	51.7
Finland	20.7	25.2	54.0	22.7	22.0	55.3	11.4	24.8	63.8
Sweden	14.5	20.5	65.0	21.1	12.0	66.8	20.5	4.0	75.6
Austria	18.5	37.0	44.4	17.0	20.8	62.3	16.7	8.3	75.0
Germany	14.8	21.4	63.7	16.3	19.8	63.9	13.7	28.2	58.1
Belgium	21.5	27.5	51.0	15.8	16.8	67.5	12.1	17.2	70.7
France	20.6	34.3	45.2	18.6	30.8	50.6	20.5	14.4	65.2
Netherlands	26.1	25.0	48.9	17.0	20.7	62.3	8.5	52.9	38.6
Greece	14.6	34.0	51.4	16.5	26.2	57.3	0.0	47.9	52.1
Italy	14.1	44.7	41.1	19.1	31.2	49.7	16.8	16.9	66.3
Portugal	18.0	36.0	46.0	18.5	18.5	63.1	11.6	53.5	34.9
Spain	8.2	33.2	58.6	17.1	10.2	72.7	10.2	13.0	76.8
UK	20.3	23.4	56.3	20.6	11.5	67.9	13.5	8.1	78.4

Sources: European Labour Force Survey (1999) and Current Population Survey (March supplement 1999).

TABLE 6b
Distribution of workers by sex composition of occupational category by age cohorts
(Less than tertiary level of education, 1999)

	25-34			35-44			45-54		
	Male	Integrated	Female	Male	Integrated	Female	Male	Integrated	Female
US	16.3	25.3	58.4	16.5	21.2	62.3	16.2	19.6	64.1
EU	15.2	21.0	63.8	15.5	18.5	66.1	14.3	19.2	66.6
Denmark	9.5	28.5	62.0	18.2	6.9	74.9	10.7	21.5	67.7
Finland	13.9	19.5	66.7	14.7	20.4	64.9	15.6	14.6	69.9
Sweden	11.2	24.9	63.9	14.2	12.9	72.8	14.4	8.5	77.1
Austria	11.5	16.6	71.9	12.6	10.6	76.9	12.7	19.3	68.0
Germany	13.8	14.6	71.8	11.9	23.3	64.8	9.5	25.9	64.7
Belgium	12.5	22.3	65.3	14.6	14.8	70.5	14.7	10.4	74.9
France	15.7	15.0	69.4	11.2	23.7	65.1	14.8	19.1	66.2
Netherlands	8.5	25.5	66.0	15.4	16.3	68.3	15.1	18.7	66.2
Greece	10.1	21.0	68.9	5.0	41.1	53.9	2.7	25.5	71.9
Italy	16.1	20.0	63.9	13.2	21.7	65.1	14.6	32.0	53.4
Portugal	5.0	41.0	54.1	4.0	30.4	65.6	8.2	21.9	70.0
Spain	12.9	16.7	70.5	7.2	29.1	63.8	11.3	19.9	68.8
UK	11.2	24.3	64.5	14.8	15.1	70.1	15.5	14.4	70.1

Sources: European Labour Force Survey (1999) and Current Population Survey (March supplement 1999).

TABLE 7 a
Gender wage differentials by age cohorts
 (main full-time jobs, tertiary level of education)

	25-34			35-44			45-54		
	Total	<i>Amount due to</i>		Total	<i>Amount due to</i>		Total	<i>Amount due to</i>	
		Characte- ristics	Coeffs.		Characte- ristics	Coeffs.		Characte- ristics	Coeffs.
US	16.0	0.1	15.9	19.2	5.6	13.5	23.4	7.1	16.3
EU	17.8	1.6	16.2	30.8	5.,7	25.1	32.5	11.5	21.0
Denmark	19.3	5.2	14.1	20.9	6.5	14.4	29.5	6.4	23.1
Finland	20.4	8.4	12.0	31.8	11.7	20.1	28.3	6.3	22.0
Sweden	12.2	-2.4	14.6	18.7	6.5	12.2	26.5	3.2	23.2
Austria	38.9	8.6	30.3	33.2	17.8	15.4	29.3	-3.8	33.1
Germany	29.3	3.5	25.9	38.2	7.4	30.7	34.1	11.1	23.0
Belgium	17.3	0.6	16.6	22.2	4.7	17.5	32.1	6.5	25.6
France	14.9	5.8	9.1	35.4	9.8	25.6	36.4	15.5	21.0
Netherlands	16.0	6.3	9.7	24.8	8.1	16.7	46.6	3.7	42.9
Greece	18.0	-1.6	19.6	17.7	2.1	15.5	34.9	8.2	26.7
Italy	10.6	-6.9	17.5	35.3	-0.7	36.0	28.6	9.9	18.7
Portugal	31.5	8.8	22.8	28.3	12.4	15.9	33.7	14.3	19.4
Spain	6.4	-5.6	12.1	16.7	0.3	16.4	31.9	12.0	19.9
UK	14.4	2.9	11.5	28.0	6.7	21.2	27.8	9.7	18.2

Sources: European Community Household Panel (1996) and Current Population Survey (February 1998, Job Tenure Supplement).

TABLE 7b
Gender wage differentials by age cohorts
(Main full-time jobs, less than tertiary level of education)

	25-34			35-44			45-54		
	Total	<i>Amount due to</i>		Total	<i>Amount due to</i>		Total	<i>Amount due to</i>	
		Characte- ristics	Coeffs		Characte- ristics	Coeffs		Characte- ristics	Coeffs
US	23.3	-0.8	24.1	29.1	4.7	24.4	29.1	2.9	26.2
EU	19.5	-1.6	21.1	30.7	2.2	28.5	33.8	5.2	28.3
Denmark	13.6	2.2	11.4	21.0	1.3	19.7	19.6	5.1	14.6
Finland	21.5	4.7	16.8	24.1	4.0	20.1	24.0	3.4	20.7
Sweden	14.2	-3.0	17.2	23.2	3.2	19.0	27.6	6.3	21.3
Austria	38.9	4.3	34.6	32.2	3.8	28.5	35.6	-0.8	36.4
Germany	20.8	-3.3	24.1	44.2	-3.5	47.7	46.1	4.8	41.3
Belgium	14.8	0.7	14.1	19.5	-2.3	21.8	24.4	-3.9	28.3
France	20.1	-1.9	22.0	26.4	1.9	24.5	23.6	1.2	22.3
Netherlands	16.4	0.1	16.3	26.2	1.4	24.9	28.6	0.7	27.8
Greece	17.1	-4.9	22.0	22.2	8.2	14.0	28.1	8.4	19.7
Italy	15.4	-2.0	17.4	17.7	-2.3	20.0	23.4	0.2	23.2
Portugal	19.0	-5.5	24.6	25.7	-4.3	30.1	14.2	-7.2	21.4
Spain	21.8	-2.1	23.9	21.7	-3.2	24.9	30.7	5.4	25.3
UK	19.6	1.5	18.1	37.6	4.8	32.8	47.6	9.7	37.9

Sources: European Community Household Panel (1996) and Current Population Survey (February 1998, Job Tenure Supplement).

TABLE 8
Dependent variable: Segregation index by age cohort
and educational attainment

Variable	Estimation method	
	WLS coef. (t)	IV coef. (t)
D25-34	-5.12 (-3.83)	-5.16 (-3.62)
D35-54	-1.85 (-1.23)	-1.67 (-1.39)
DEHDU	-7.55 (-6.23)	-9.11 (-5.32)
PT	.18 (3.18)	.21 (2.84)
WG	0.08 (1.32)	0.11 (1.57)
Constant	46,74 (26.02)	49.84 (24.67)
Adjusted R Square	0.19	0.51
Standard Error	5.77	6.02
N obs.	78	78

Note: D25-34 and D35-44 are cohort dummies. DEHDU stands for a higher education dummy