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Female participation increases and gender segregation

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Abstract: This article examines the impact of a large increase in female participation on occupational segregation. Increases in female participation may decrease occupational segregation if women enter male dominated sectors but may increase segregation if they enter already female dominated sectors. Using Ireland as a test case due to the recent large increase in female participation rates, we firstly carry out a decomposition analysis between 1991 and 2006 and find that the rise in female employment was driven predominantly by increased demand while between one tenth and one fifth of the rise was due to women increasing their share of occupational employment. Formal measures of segregation show that occupational segregation fell over this time period. The formal measures of segregation show that the level of occupational grouping is important with stagnation or smaller falls in segregation using a broad occupational grouping and sharper falls using a more detailed occupational grouping. Our findings support previous U.S. research that found a rise in female participation resulted in a decline in occupational segregation.

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1 Introduction

Gender differentiation in representation across different types of occupations has been a persistent feature of industrialised societies (see, for example, Charles and Grusky, 2004). However, there has been considerable debate about the relationship between occupational segregation and other measures of gender equality, such as women's representation in the paid workforce. Thus, a growth in female labour market participation rates may involve a reduction in segregation due to women entering previously male-dominated jobs. Alternatively, growing female labour force participation may be accompanied by increasing segregation if the growth is mainly confined to previously female-dominated occupations. Empirical tests of these alternative explanations have reached contradictory conclusions. From the 1960s to the 1980s, the United States saw a trend towards increasing female labour force participation and declining segregation (England, 2005; Semyonov and Jones, 1999). Bettio (2002), however, shows a clear positive correlation between the formal segregation measures and the female employment rate for a variety of European countries for the year 2000. Research by the OECD (2002) supports the view that occupational segregation has a positive link with female participation rates.

Other commentators have suggested that the degree of occupational segregation is higher in more 'gender-egalitarian' regimes where women are not only strongly represented in the workforce but in political and economic life more generally (Blackburn and Jarman, 2006). Cross-national analysis carried by Korpi et al. (2009) using the 2006 EU Survey of Income and Living Conditions (SILC), found a high level of segregation in Ireland but it was grouped at the top of the scale with some of the most gender egalitarian regimes such as Sweden, Norway and Denmark, and Finland (which had the highest level of segregation). The authors argue however that these cross-country comparisons are influenced by the proportion of women not in the labour force at all, so they also recalculate the

measures of segregation including homemakers as an additional category. Using these calculations Ireland was found to have the highest level of gender segregation among the 14 countries included.

This article examines the participation-segregation relationship using Ireland as a test case. It focuses on a period of rapidly increasing female labour force participation to explore the consequences of this trend for the degree of segregation in the labour market.

The layout of the article is as follows. Section 2 defines what is meant by segregation and how it can be measured. Section 3 examines the literature regarding the causes and consequences of occupational segregation. Section 4 looks at the specific Irish context regarding increased female participation and educational attainment. Section 5 performs a shift-share analysis to examine whether changes in female employment across occupations between 1991 and 2006 were driven predominantly by increases in labour demand in these sectors or by increases in the share of women in these occupations. Section 6 provides the summary measures of segregation while Section 7 concludes.

2 Conceptualising and Measuring Gender Segregation

There is now a consensus among commentators that analyses of segregation should distinguish between horizontal segregation, which occurs when men and women work in different types of occupations, and vertical segregation, when men are most commonly found in higher grades and women in lower grade within the same occupations (see for example, Hakim, 1979; Blackburn et al. 2000).

There has been a good deal of debate about the appropriate measure to use for horizontal segregation. Hakim (1979) used the Sex Ratio Index, a summary measure of the over-representation and under-representation of women in occupational categories, a measure which was subject to a good deal of criticism due to its sensitivity to the overall level of female employment (Siltanen, 1990). Standardising the index to take account of the female employment level indicates different

trends for Britain to the unstandardised index (Siltanen, 1990), though this standardised index has itself been subject to criticism (Watts 1990). Another commonly used measure of segregation is the Index of Dissimilarity. This measure is concerned with comparing the distribution of males and females across occupational groups and, as such, is not affected by changes in the level of female labour force participation. However, changes in the index must be interpreted with some caution since the index reflects variations in the relative size of occupational groups as well as variations in the gender composition within occupations (Bettio, 1988). Furthermore, for comparative purposes the index is sensitive to the size of occupational categories across countries (Korpi et al. 2009). An alternative measure, the Index of Association, has been developed by Charles and Grusky (2004) to overcome some of the limitations of previous measures. It reflects the extent to which gender ratios within different categories of occupations deviate from the mean of ratios calculated across all categories of occupations.

Regardless of the index used, analyses of segregation patterns are sensitive to the degree of aggregation of occupational groups. Thus, using very broad occupational categories is likely to mask the level of gender segregation in the labour market. This article uses two different levels of occupational aggregation in order to explore the potential impact of using more detailed occupational information.

The measurement of vertical segregation is even more contentious, mainly because of a failure to unpack what a 'higher grade' occupation actually means. We do not attempt to cover this issue here. International research indicates differences in the processes shaping horizontal and vertical segregation (see below). Countries which are more egalitarian in terms of gender policy have been found to have higher levels of horizontal segregation but lower levels of vertical segregation (Blackburn and Jarman, 2006; Charles, 2003). Furthermore, Semyonov and Jones (1999) suggest that horizontal segregation declines with increased female labour force participation but that vertical segregation actually increases.ⁱ This article focuses on the issue of horizontal segregation and how

this is affected by a large increase in female participation rates. A hierarchical structure may of course still exist across occupational groups.

3 Occupational Segregation – Causes and Consequences

3.1 Causes of Occupational Segregation

There has been considerable debate about the factors shaping occupational segregation by gender, with explanations falling broadly into ‘supply-side’ and ‘demand-side’ perspectives.

Supply-side perspectives have focused on the role of rational choice and cultural factors. Becker (1985) suggests that the gender pay gap and the desire for women to enter certain occupations are due to the role of specialisation and division of labour in a household. Due to the fact that women tend to take on more of the caring and domestic responsibilities Becker suggests that they opt for less demanding occupations as a result. Human capital theorists suggest that occupational segregation reflects the fact that women choose jobs which will not penalise (anticipated) labour market discontinuity (Mincer and Polacheck, 1974; see also Breen and Goldthorpe, 1997, from a rational choice perspective). A number of theorists have related occupational segregation to gender role socialisation, whereby children develop stereotyped notions of ‘male’ and ‘female’ from what they see and hear around them and they attempt to behave in ways consistent with these conceptions (see, for example, Bussey and Bandura, 1999). Education plays a role both through attainment level and field of study chosen. Segregation in the types of jobs held by women and men and segregation in the types of subjects or courses taken by girls and boys are interconnected (Borghans and Groot, 1999). Cross-national research indicates that countries with higher levels of educational segregation by gender tend to have higher levels of occupational segregation in the labour market (Buchmann and Charles, 1995). Educational attainment has an influence over and above the effect of subject choice or field of study since qualifications may operate as a ‘lever’ to secure female entry into previously male-dominated occupations (see Crompton and Sanderson,

1990). Thus, trends for the U.S. indicate declining segregation levels amongst the more highly educated group but stable segregation rates for those with lower levels of qualifications (Evertsson et al. 2009).

Demand-side explanations have focused on a range of factors, including employer behaviour and the broader institutional context. Gender differences in job allocation may reflect 'statistical discrimination' on the part of employers, who make assumptions about the career trajectories of women as a group (Bielby and Baron, 1984). Gender identities are found to shape, and be shaped by, the occupational division of labour, with assumptions regarding the gender of job occupants often built into the labour process from the outset (Rubery and Fagan, 1993). Thus, the expansion of female employment, and accompanying increased horizontal segregation, have been related to the growth in gendered 'care' and service work within modern welfare States (Charles, 2003; Korpi et al. 2009). The increased availability of part-time jobs within the service sector is also seen as having facilitated increased segregation (Charles, 2003). Chang (2004) points to the influence of state policies on occupational segregation (specifically maternity leave, anti-discrimination, and protective legislation).

3.2 Consequences of Occupational Segregation

As discussed above horizontal occupational segregation may be driven by a number of factors. If we see occupational segregation as a 'rational choice' then it need not be viewed as a societal 'problem'. However if occupational segregation is driven, at least partially, by discrimination or due to other issues such as sex-role socialisation, legacy effects from female employment bans in certain occupations, a lack of flexible working arrangements or the high cost of childcareⁱⁱ it may be viewed as a negative outcome for both genders.

Bettio and Verashchagina (2009) discuss the implications of occupational segregation at both an individual and macroeconomic level. At the individual level, occupational segregation can be viewed negatively if it results in an undervaluation of women's work, wage discrimination and a lack of job quality. At a macroeconomic level they state that "segregation may be exacerbating skill shortages insofar as it impedes the efficient reallocation of male and female workers and distorts the allocation of future flows of workers" (page 46).

One of the main negative consequences attributed to occupational segregation is its contribution to the gender pay gap. Both horizontal and vertical segregation may contribute to the gender pay gap - horizontal in that women are traditionally concentrated in lower paying occupations and vertical in that women are traditionally more highly concentrated at the lower (and hence lower paying) levels within an occupational group. Research in this area tends to focus on the extent to which human capital factors (such as education and experience) can explain gender pay gaps and how much is attributable to occupational segregation as well as unmeasurable factors (such as discrimination, choice etc). Treiman & Hartmann (1981) found that human capital factors only explained a small component (35-40%) of the gender pay gap in the U.S. In the Irish context McGuinness et al. (2009) found that industrial and occupational segregation accounted for around 13% of the gender pay gap. Baron and Cobb-Clark (2010) found that the degree to which occupational segregation contributes to the gender pay gap differs between low and high wage workers. The gender pay gap amongst lower paid workers was more than explained by wage-related characteristics (such as education and labour market experience) while such characteristics did little to explain the gender pay gap amongst high wage workers.

4 Irish Context

4.1 Female Participation Rates

Female participation rates grew substantially over the period examined as seen in Figure 1. Female participation rates in Ireland lagged substantially behind the EU15 average in the early 1990s. Growth in the female participation rate accelerated over the mid to late 1990s as the Irish rate converged to that of the EU15 average. The gap in female participation rates between Ireland and the EU15 average fell from 12 percentage points in 1992 to just 2 by 2006. Overall, the Irish female participation rate grew by 41.3% between 1992 and 2006, compared to a 15.3% growth in the EU15 female average rate.

Male participation rates also increased over the time period, surpassing the EU15 average in 1998 but the growth in the male participation rate (6.4%) is miniscule compared to the changes seen in female participation rates over the same time period. This huge growth in female participation rates makes Ireland an interesting test case to examine the impact of such an increase on occupational segregation.

[Figure 1 here]

4.2 Education and Attitudes

Recent decades have seen a rapid expansion in rates of entry to higher education in Ireland, with female entrants outnumbering their male counterparts since the mid-1990s. As in many other Western countries, educational expansion has occurred side-by-side with considerable continuity in the degree of gender differentiation in the types of subjects taken. Within second-level education, female students are underrepresented in technological subjects and physics, and overrepresented in

home economics, music and languages (Smyth & Hannan, 2006; Smyth & Darmody 2009). Gender differentiation in field of study is also evident within higher education (Dept of Education & Science, 2007; Russell et al, 2010). Women are underrepresented in engineering and construction-related fields and overrepresented in education and social sciences. While the broad gendering of subject areas has remained remarkably stable over time, there has been a shift in the female share within a number of areas, including medicine and law. Figure 2 shows the educational composition of the female labour force between 1998 and 2009. A clear increase in the proportion of females with third level education is visible, a factor likely to influence occupational segregation (the 'lever' theory discussed in Crompton and Sanderson, 1990).

[Figure 2 here]

Attitudes regarding gender roles are also likely to play a part in occupational segregation as discussed in Section 3. Table 1 looks at the percentage of men and women agreeing with a variety of statements regarding gender roles in 1990 and 2008. A clear change in values regarding views on female employment and the impact it has on women themselves and their children is visible over time. In particular, views on female employment have become more favourable.

[Table 1 here]

4.3 Occupational Change: 1991-2006

In order to examine the change in gender segregation over the period of rising female participation Census information from 1991 and 2006 is analysed. The Census uses the Standard

Occupational Classification (SOC) which has been used to classify occupations in the Census back to 1991. Information is available at different occupational grouping levels – a broader category with 25 ‘two-digit level’ occupations and a more detailed category with 225 ‘three-digit level’ occupations.

4.3.1 Two-Digit Level

Before the issue of gender segregation is addressed it is first useful to consider how men and women are distributed across the broad occupational categories. This allows us to establish the concentration of men and women in different occupations and how this has changed over the period 1991 to 2006. Table 2 presents information from the 1991 and 2006 Irish Censuses on the number of men and women in the labour force in each of the 25 occupational sub-groups at the two time points. Between 1991 and 2006 the number of women employed grew by 93%. While the rise in male employment was also dramatic (increasing by one third) it did not match the rate for women. Consequently, the overall female share of employment rose substantially from 34% in 1991 to 42% in 2006. This period of rapid employment growth led to high levels of increase in female employment across a wide range of occupations. Of the twenty five occupational groups considered here, only three recorded a decline in female employment over the period: religious occupations, textile, clothing and leather workers, and farming, fishing and forestry workers. Male employment in these sectors also declined. Women more than doubled their employment in thirteen of the occupations.

[Table 2 here]

Overall however, women remain concentrated in a small number of occupations. Table 3 shows the five most dominated occupations by gender in 1991 and 2006. In 1991 63% of women were

employed in the 5 female dominated groups as were 60% in 2006. The picture is different for men however. While there was a concentration in building and construction workers in 2006, largely driven by the building boom, men tended to be more evenly spread across occupations. In 2006 the top five male occupations accounted for 45% of men's employment. Also, the top five male dominated occupations tend to be more hyper-segregated than the female ones (with the top five male occupations consisting of 91-99% males during this time compared to the top five female dominated occupations which were between 63-83% female).

[Table 3 here]

The issue of gender segregation is crucially concerned with the level of representation of men and women within occupations. Of the ten categories that saw the largest percentage increase for females seven were occupations where women were under-represented in 1991 i.e. below the 34% share of female employment level (business and commerce; garda; army; managers and executives; building and construction; scientific and technical; other). The remaining 3 categories (social workers and related; other professional; personal service and childcare) had an over-representation of women, two of which were already over 50% female in 1991 (social workers and related; personal service and childcare). In these cases rising female employment has been associated with increased gender segregation. In 8 of the remaining categories women were also over-represented in 1991 and 5 of these have become more 'feminised' over the period.

In contrast to the overall picture, the female share declined in 6 occupational groups (computer software; other manufacturing; engineering and allied trade; farming, fishing and forestry; textile, clothing and leather; religious occupations). The most notable decline in the female share occurred in computer software occupations. Despite a doubling of the number of women in this category,

male employment tripled. Textile production work was highly female dominated in 1991 therefore the decline in female share represents a reduction in segregation. Employment in the engineering and allied trade workers group, and other manufacturing occupations increased significantly over the period for men but remained stagnant for women resulting in greater gender segregation in both of these occupations.

4.3.2 Three-Digit Level

The figures outlined above for the broad occupational groups show a complex picture of reduced segregation in some areas and increased segregation in others. The diverse trends within occupations are further in evidence if the more detailed three-digit occupational categories are examined.ⁱⁱⁱ

The detailed three digit categories reveal the existence of a number of hyper-segregated occupational categories. Men employed in the top ten male-dominated occupations at this level are again concentrated in building and construction. There were fewer than 730 women in the top ten male-dominated occupations. Women employed in the top ten female-dominated occupations are concentrated in clerical, medical and personal service sectors and in 2006 they numbered just under 200,000. This is equivalent to 22% of the total number of women at work, and 9.4% of total employment. There were 16,553 men working in the top ten female-dominated occupations in 2006.

While sex segregation is extreme in the case of both the top ten male and female-dominated occupations, the top ten female occupations are somewhat more integrated than the male ones. Defining a gender dominated occupation as one where over 80% of the occupation is one gender, consistent with international literature, there were 4.8 times more male-dominated occupations than female-dominated occupations in 2006.^{iv} This compares to 6.4 times more in 1991. The fall in

the number of male-dominated occupations suggests that they may have become somewhat more integrated since 1991.

This description shows that trends in terms of gender segregation over the period 1991 and 2006 are not easily summarised. There is certainly some evidence of reduced segregation, as women's share of employment has substantially increased in a number of previously male-dominated occupations. However this has also occurred alongside a growing feminisation of certain occupational categories for example teaching, social work, personal services and care work. In order to measure the overall level of change in a meaningful way a more formal test of the change in gender segregation over the period is applied in the Section 6.

5 Decomposition Analysis

It is necessary to disentangle the effect that overall growth in occupations has on segregation. As discussed by Rubery (1988) an increase in female participation rates may be due to a rise in demand, with sex segregation held constant (or even increasing). Alternatively female participation may increase due to changes in occupational segregation with demand being held constant.

This section uses decomposition analysis (also known as shift-share analysis) to begin to isolate such effects. Following Rubery (1988) and using Census information the change in female employment is broken down into three effects: the growth effect which gives the change derived from the growth/decline in employment in each occupation holding sex segregation constant, the share effect which gives the change in the proportion of women in each occupation holding total employment in each occupation constant and finally the interaction effect which gives us the change

in female employment due to the interaction of changing total employment in each occupation and changing proportions of women in each occupation.

Let F_t be female employment in year t .

$$F_t = \sum T_{it} p_{it}$$

Where T_{it} is total employment in industry/sector i in year t and p_{it} is the proportion of female to male employment in sector i in year t .

Then:

$$\Delta F_t = F_t - F_{t-1} = \quad (1)$$

$$\sum (T_{it} - T_{it-1}) p_{it-1} + \quad (2)$$

$$\sum (p_{it} - p_{it-1}) T_{it-1} + \quad (3)$$

$$\sum (p_{it} - p_{it-1}) (T_{it} - T_{it-1}) \quad (4)$$

Where the change in female employment (1) is made up of the growth effect (2), the share effect (3) and the interaction effect (4).

5.1 Analysis at the 2 digit Code Occupational Level

Table 4 shows the decomposition analysis for Ireland between 1991 and 2006^v. It tells us that, of the increase in female employment over the period 1991 to 2006, the majority, 65%, was due to the growth effect while 21% was due to an increase of female share in total employment. Only 6 of the 25 occupational groups had a negative share effect indicating that the female share in 19 occupations rose. If the share effect is positive for an already female dominated occupational group a further rise in feminisation of a particular occupational group will be observed. Therefore, the information in Table 4 tells us only whether or not the increase in female employment in a particular occupational group was driven mainly by the increase in demand for workers in this group or an increase in the female share in that occupation. Large growth effects may also mask a declining female share in an occupational group. For example occupations with a growth effect in excess of 100% are observed accompanied by a negative share effect whereby female employment has risen overall but female share in this category has fallen (specifically in the categories engineering and allied trade workers; other manufacturing workers and computer software occupations). In order to answer the main question posed in this article - does a sharp increase in female participation rates serve to increase or decrease horizontal occupational segregation - we must move to summary measures of segregation. Section 6 will provide this information.

5.2 Analysis at the 3 digit Code Occupational Level

Focusing on these broad occupational groups may disguise significant movement within the groups. For this reason we also carry out a decomposition analysis on the 225 sub-groups within the 25 broad occupational groups^{vi}. It can be seen that when breaking down the broad occupational groups into more detailed sub groups the growth effect accounts for even more of the increase in female employment than when examining the broader occupational groups (72% compared to 61%). This results in a smaller role for the share effect (13% compared to 21%). This helps illustrate the importance of the level of occupational grouping and its impact on our view of changes in segregation.

6 Formal Measures of Segregation

The preceding analysis shows an overall trend of increased female share in most occupational groups between 1991 and 2006. As mentioned, however, this general rise in female share may serve to increase or decrease occupational segregation depending on the gender structure of the occupation to begin with. If an occupation is already female dominated, an increase in the female share results in higher gender segregation. For this reason, the analysis now focuses on summary measures of segregation and how these have changed in conjunction with a large increase in female participation rates. The most widely used measure of segregation is the Index of Dissimilarity (ID). It is commonly interpreted as the percentage of men or women that would have to change occupations to bring about a perfect correspondence between the sex composition of each occupation and that of the entire labour force. The formula for calculating the ID is shown in equation 1 below. The index has a minimum value of 0 if there is no occupational segregation (the same percentage female in every occupation) and a maximum value of 1 if there is complete segregation (each occupation is completely female or completely male).

Index of Dissimilarity (ID):

$$ID = \frac{1}{2} \sum_{j=1}^J \left| \left(\frac{F_j}{F} - \frac{M_j}{M} \right) \right| * 100 \quad (1)$$

ID (and variants) have been widely used in the past but are sensitive to the size of occupations, the number of occupational categories and the female labour market participation rate. Therefore, an alternative measure, the Index of Association (IA), has recently been proposed by Charles and Grusky (2004). IA expresses the extent to which occupation-specific sex ratios deviate from the mean of such ratios calculated across all occupations. IA is insensitive to occupational sizes and female labour market participation rates and more suitable for analysing occupational segregation across countries and across time. This index can be interpreted as the factor by which males or females are, on average, over-represented in the occupational categories being analysed.^{vii} A higher value for the IA, therefore, indicates a higher level of segregation. The formula for calculating the IA is shown in equation 2 below.

Index of Association (IA):

$$IA = \exp \left(\left(\frac{1}{J} \right) * \sum_{j=1}^J \left\{ \ln \left(\frac{F_j}{M_j} \right) - \left[\frac{1}{J} * \sum_{j=1}^J \ln \left(\frac{F_j}{M_j} \right) \right] \right\}^2 \right)^{\frac{1}{2}} \quad (2)$$

Where:

J = Number of occupations.

M_j = Number of men in jth occupation.

F_j = Number of women in jth occupation.

M = Number of men in the labour force.

F = Number of women in the labour force.

[Table 5 here]

Firstly the levels of segregation are calculated for the 25 intermediate occupational categories. Results are shown in Table 5. In 1991 ID stood at 49.2, suggesting that just under half of job incumbents would have to switch occupations to have a fully desegregated workforce. In 2006 the ID remained relatively unchanged, increasing slightly to 49.4. On the basis of the 25 intermediate occupational categories it is found that the IA fell by 14% from 5.2 to 4.5. As shown in Table 5, moving to the more detailed (three digit) occupational categories reveals a further layer of segregation. Within these occupational categories hyper-segregated occupations are often in evidence. Extending the analysis to consider all 225 detailed occupational groups produces a higher estimate of the level of gender segregation in the Irish labour market. For example in 2006 the ID value was 58.6 across the 225 occupations compared to 49.4 for the 25 category classification.^{viii} However the value of the index increases as the number of occupations increase (Anker 1998) so it is informative to consider whether the same **trends** in ID emerge using the more detailed classifications. In contrast to stagnation at the 25 category level the ID experienced a small fall of 5% at the more detailed 225 category level, falling from 62.0 in 1991 to 58.6 in 2006. The more robust IA also records a higher level of gender segregation when the 225 occupational groups are considered and a stronger downward trend is evident over the period, falling by 23% from 8.7 in 1991 to 6.7 in 2006. This is indicative of a sharp decline in segregation at a more detailed occupational level.

What do the results tell us of the trends in segregation over time and more specifically how do these trends relate to female participation rates? As mentioned in Section 1 the sign of the link

between female participation rates and occupational segregation is unclear. The results shown here for the Irish case -mainly a negative correlation between female employment and occupational segregation, excluding little change in the ID at the 25 category level - supports the findings of England (2005), Semonoyov and Jones (1999) and not those of Bettio (2002) and OECD (2002). The finding here also show the importance of the occupational level that is analysed, with sharper declines in segregation shown when using a larger number of occupational groups.

7 Conclusion

International research has been inconclusive about the relationship between different dimensions of gender equality in the labour market. Ireland provides an interesting test-case for exploring the association between female labour force participation rates and occupational segregation because of the very rapid increase in female employment during the 'Celtic Tiger' years.

In common with other research, the analysis here distinguishes between horizontal segregation (the type of jobs held by women and men) and vertical segregation (the level of jobs held by men and women within an occupation) and focus on the impact on the former of a large increase in female participation. Shift-share analysis was used to examine the sharp increase in female employment and the extent to which this increase was driven by an increase in demand or an increase in female share in each of the occupations. The analysis indicates that the increase in female employment was largely driven by growth in the size of particular occupational groups. However between one tenth and one fifth (depending on the disaggregation level of occupations chosen) of the increase in female employment was due to a change in the share effect, that is, to shifting proportions of women within occupational groups. The process was mainly (but not exclusively) one of feminisation, with women increasing their representation across most occupational groups. Feminisation does not necessarily mean declining segregation, however.

Increasing feminisation can mean increasing segregation if it happens in already 'female' occupations. Thus, the analyses indicate that women increased their share in already largely female jobs, such as childcare. This may reflect a 'tipping point' phenomenon whereby men start to withdraw from entering particular occupations as they become feminised (see England 2005). However, feminisation can result in a reduction in segregation if it happens in previously male-dominated occupations. Analyses also indicate this process at work in particular occupational categories, especially in the professions.

It is possible to summarise the overall level of horizontal segregation. Here the Index of Dissimilarity and the Index of Association are used. Both indices show similar trends with general declines in segregation between 1991 and 2006, particularly when focusing on the more detailed (225) occupational categories and using the more robust Index of Association measure. The segregation trend indicates that as female labour force participation rose horizontal occupational segregation fell. What other factors can account for this reduction in horizontal segregation? There appear to be two possible 'levers' which have effected change. Firstly, the increasing representation of women in particular fields of study within higher education (such as medicine and law) has fed through into an increasing share of women in the related occupations. Secondly, the patterns suggest that the more bureaucratic recruitment procedures for public sector jobs may enhance female access to predominantly male jobs; the data indicate a significant increase over time in the representation of women in army and Garda jobs, for example. Therefore, this article finds similar results to the U.S. case whereby increasing female labour force participation was accompanied by declining segregation. Some sets of occupations remain more resistant to change, however; this applies in particular to skilled manual work that is predominantly male in profile. In the context of rapid employment expansion, the female share among building and construction workers increased from 1.4% in 1991 to 2.7% in 1996 and declined to 2.5% by 2006. Thus, even a large share effect is not sufficient to secure large-scale change in highly gendered occupations.

ⁱ This is driven by the idea that when fewer women are in the labour force, they are more likely to be better educated than the general female population and thus have more access to higher-prestige professional and managerial occupations.

ⁱⁱ Immervol and Barber (2005) found that Ireland was one of the most expensive countries in the OECD for childcare costs relative to wages.

ⁱⁱⁱ The employment figures at the three digit level are not provided due to a lack of space but are available from the authors upon request.

^{iv} Note this is partly affected by the fact that the occupational classification is more detailed for the type of occupations men tend to be employed in compared with the type of occupations women are employed in. See Anker (1998) for a discussion.

^v We exclude those who do not state their occupation.

^{vi} Again, results are not shown due to a lack of space but are available upon request from the authors.

^{vii} The IA expresses the extent to which occupation-specific sex ratios deviate from the mean of such ratios calculated across all occupations. IA is insensitive to occupational sizes and female labour market participation rates and more suitable for analysing occupational segregation across countries and across time. See Charles and Grusky (2004) for more detail.

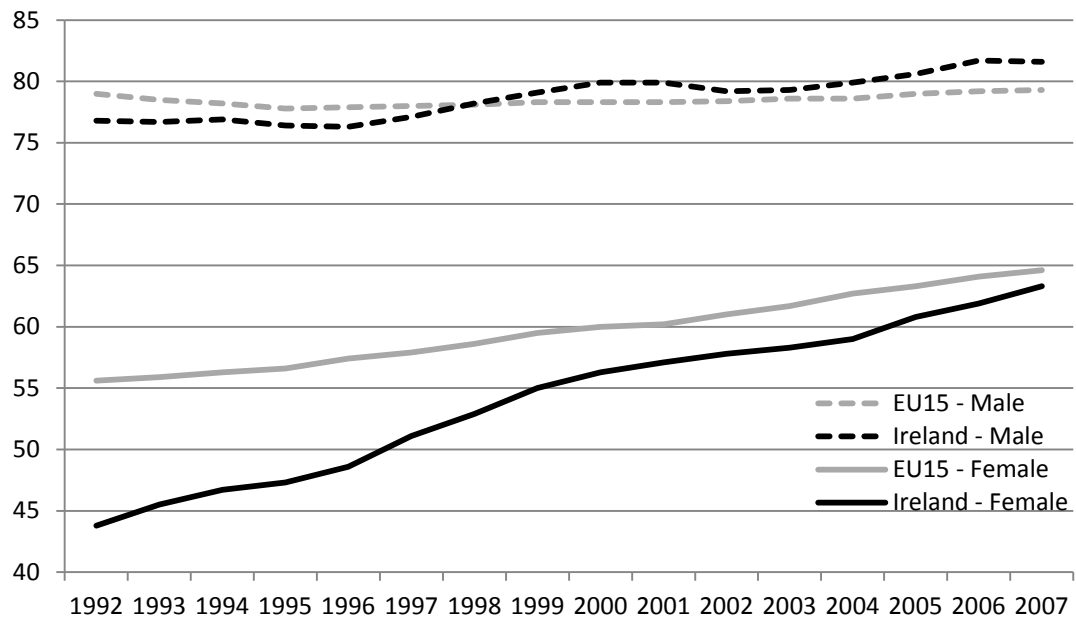
^{viii} Hughes (2002) using 218 occupations found that segregation as measured by ID had declined in Ireland between 1991 and 1996 from .61 to .58.

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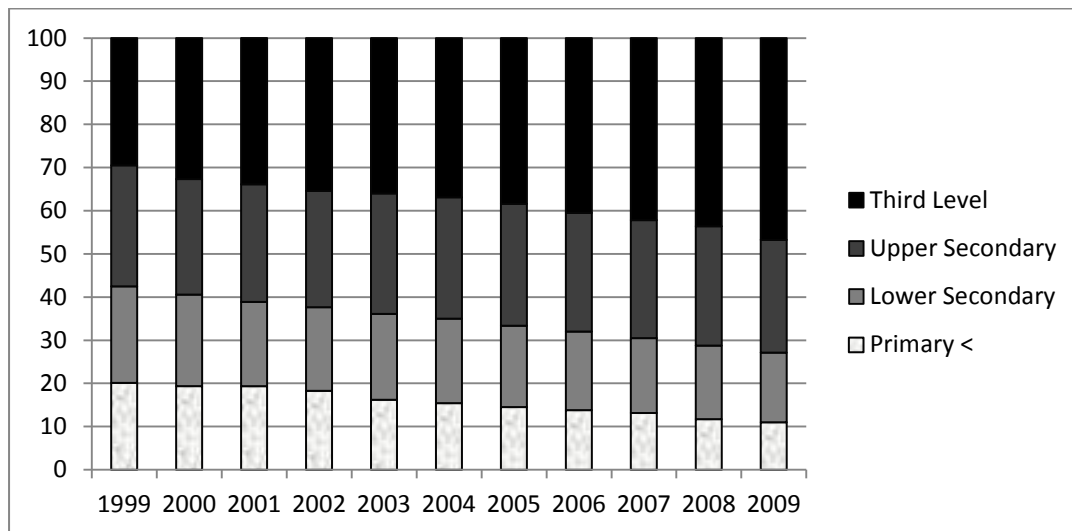
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Figure 1 : Male and Female Participation Rates (1992-2007)



Source: EUROSTAT

Figure 2 : Educational Composition of the Female Labour Force 1998-2009



Source: Quarterly National Household Survey

Table 1 Changing Gender Role Attitudes in Ireland: 1990 and 2008

	Men		Women	
	1990	2008	1990	2008
	%		%	
	Agreeing		Agreeing	
When jobs are scarce, men have more right to a job than women	35.9	21.7	35.1	12.5
A working mother can establish just as warm and secure a relationship with her children as a mother who does not work	59.4	78.5	66.2	78.4
A pre-school child is likely to suffer if his or her mother works	60.2	40.5	46.0	29.7
Having a job is the best way for a woman to be an independent person	62.1	67.6	59.6	66.4
Both the husband and wife should contribute to household income	67.8	75.3	72.6	75.2

Source: Calculated using the European Values Survey, 1990 and 2008

Table 2 : Distribution of Female and Male Workers by Intermediate Occupational Group and Change Over Time

Occupational Group:	Men		Women		% Change 1991-2006		Female Share	
	1991	2006	1991	2006	Male	Female	1991	2006
Farming, fishing & forestry workers	147,955	80,117	15,594	8,297	-46%	-47%	9.5%	9.4%
Electrical trades workers	27,676	37,038	826	1,337	34%	62%	2.9%	3.5%
Engineering & allied trades workers	62,884	77,456	1,898	1,929	23%	2%	2.9%	2.4%
Textile, clothing & leather workers	7,552	3,257	16,456	4,159	-57%	-75%	68.5%	56.1%
Food, drink & tobacco production workers	22,532	19,208	5,613	6,868	-15%	22%	19.9%	26.3%
Chemical, paper, wood, plastics & printing workers	13,622	13,488	5,437	5,780	-1%	6%	28.5%	30.0%
Other manufacturing workers	32,333	55,514	18,346	19,200	72%	5%	36.2%	25.7%
Building & construction workers	86,402	178,929	1,259	4,500	107%	257%	1.4%	2.5%
Managers & executives	38,798	72,590	13,487	52,808	87%	292%	25.8%	42.1%
Communication, warehouse & transport workers	75,079	102,400	5,228	12,519	36%	139%	6.5%	10.9%
Clerical & office workers	31,674	31,089	102,383	151,111	-2%	48%	76.4%	82.9%
Sales occupations	84,862	94,445	59,277	110,657	11%	87%	41.1%	54.0%
Business & commerce occupations	19,086	41,448	7,728	37,614	117%	387%	28.8%	47.6%
Computer software occupations	7,751	33,191	6,207	12,397	328%	100%	44.5%	27.2%
Scientific & technical occupations	20,687	45,301	4,396	13,677	119%	211%	17.5%	23.2%
Health & related workers	13,314	19,753	45,169	73,312	48%	62%	77.2%	78.8%
Social workers & related occupations	1,825	4,761	3,270	12,933	161%	296%	64.2%	73.1%
Religious occupations	5,001	3,106	4,066	796	-38%	-80%	44.8%	20.4%
Other professional workers	11,548	22,605	6,246	19,684	96%	215%	35.1%	46.5%
Personal service & childcare workers	37,195	64,783	48,716	140,414	74%	188%	56.7%	68.4%
Teachers	20,415	23,379	34,004	57,519	15%	69%	62.5%	71.1%
Central & local government workers	16,993	24,800	14,683	33,272	46%	127%	46.4%	57.3%
Garda Síochána	10,403	10,026	502	2,299	-4%	358%	4.6%	18.7%
Army occupations	11,022	7,042	95	400	-36%	321%	0.9%	5.4%
Other gainful occupations (incl. not stated)	84,027	131,713	37,333	99,205	57%	166%	30.8%	43.0%
All occupations	890,636	1,197,439	458,219	882,687	34%	93%	34.0%	42.4%

Source: Distribution derived from Census figures – Census of Population 1996, Vol. 7, Table 5 for 1991; Census of Population 2006, Volume 8, Table 5 for 2006.

Table 3 : Top Five Dominated Occupational Groups by Gender, 1991 and 2006

Male			
1991		2006	
	% Male		% Male
Army occupations	99.1%	Engineering and allied trades workers	97.6%
Building and construction workers	98.6%	Building and construction workers	97.5%
Electrical trades workers	97.1%	Electrical trades workers	96.5%
Engineering and allied trades workers	97.1%	Army occupations	94.6%
Garda Síochána	95.4%	Farming, fishing and forestry workers	90.6%

Female			
1991		2006	
	% Female		% Female
Health and related workers	77.2%	Clerical and office workers	82.9%
Clerical and office workers	76.4%	Health and related workers	78.8%
Textile, clothing and leather workers	68.5%	Social workers and related occupations	73.1%
Social workers and related occupations	64.2%	Teachers	71.1%
Teachers	62.5%	Personal service and childcare workers	68.4%

Source: Own calculations derived from Census figures – Census of Population 1996, Vol. 7, Table 5 for 1991: Census of Population 2006, Volume 8, Table 5 for 2006.

Table 4 : Decomposition Analysis of Occupational Change for Female Workers 1991-2006, Intermediate Occupational Group

Occupational Group	Growth effect*	Share Effect**	Interaction Effect***	Employment Change	Growth effect %	Share Effect %	Interaction Effect %
Farming, fishing & forestry workers	-7164	-246	113	-7297	-98%	-3%	2%
Electrical trades workers	286	167	58	511	56%	33%	11%
Engineering & allied trades workers	428	-324	-73	31	1380%	-1045%	-235%
Textile, clothing & leather workers	-11373	-2992	2068	-12297	-92%	-24%	17%
Food, drink & tobacco production workers	-413	1800	-132	1255	-33%	143%	-11%
Chemical,paper,wood,rubber,plastics & printing workers	60	280	3	343	17%	82%	1%
Other manufacturing workers	8701	-5323	-2524	854	1019%	-623%	-296%
Building & construction workers	1375	892	974	3241	42%	28%	30%
Managers & executives	18860	8531	11930	39321	48%	22%	30%
Communication, warehouse & transport workers	2253	3520	1517	7291	31%	48%	21%
Clerical & office workers	36768	8800	3160	48728	75%	18%	6%
Sales occupations	25071	18489	7820	51380	49%	36%	15%
Business & commerce occupations	15058	5029	9799	29886	50%	17%	33%
Computer software occupations	14066	-2411	-5464	6190	227%	-39%	-88%
Scientific & technical occupations	5940	1421	1920	9281	64%	15%	21%
Health & related workers	26709	901	533	28143	95%	3%	2%
Social workers & related occupations	8086	454	1123	9663	84%	5%	12%
Religious occupations	-2316	-2216	1263	-3270	-71%	-68%	39%
Other professional workers	8598	2036	2803	13438	64%	15%	21%
Personal service & childcare workers	67641	10072	13985	91698	74%	11%	15%
Teachers	16546	4688	2281	23515	70%	20%	10%
Central & local government workers	12236	3466	2888	18589	66%	19%	16%
Garda Síochána	65	1532	200	1797	4%	85%	11%
Army occupations	-31	503	-166	305	-10%	165%	-54%
Other gainful occupations (excl. not stated)#	-8192	17182	-5394	3596	-228%	478%	-150%
All occupations (excl. not stated)	239258	76251	50683	366192	65%	21%	14%

Source: Own calculations derived from Census figures – Census of Population 1996, Vol. 7, Table 5 for 1991: Census of Population 2006, Volume 8, Table 5 for 2006.

* Impact of changes in the total employment in each occupation

** Impact of changes in the proportions of women in each occupation

*** Impact of the interaction between changing occupational employment & changing proportions of women in each occupation

Note that subgroups 'Gainfully occupied but occupation not stated' & 'All Other Gainful Occupations N.E.S' are excluded from this category

Table 5 : Indices of Segregation in Ireland 1991 to 2006

	1991	2006
<u>25 Occupations:</u>		
Dissimilarity Index	49.2	49.4
Index of Association	5.2	4.5
<u>225 Occupations:</u>		
Dissimilarity Index	62.0	58.6
Index of Association	8.7	6.7

Source: Own calculations derived from Census figures – Census of Population 1996, Vol. 7, Table 5 for 1991: Census of Population 2006, Volume 8, Table 5 for 2006.

Excludes those who are employed but do not state their occupation.

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