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INDICATORS ON GENDER SEGREGATION*

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ABSTRACT

The objective of this study is to analyse ways of measuring gender segregation, and to consider specifically how the different types of indices can be used and interpreted. The different indicators of segregation are calculated for the EU member-states and a comparative analysis of the situation of European labour markets is made using the different indices.

This paper also intends to make a general discussion on the issue of gender segregation, to give recommendations as to how segregation should be measured using current tools and to suggest improvements to existing ways of measuring segregation.

Keywords: Labour market, gender, segregation

JEL classification: J16, J82

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1. Introduction

Segregation of the labour market from a gender perspective has been frequently presented as one of the prevailing characteristics of European labour markets. On the European political level desegregation has become one of the main objectives of both the European action programmes for equal opportunities and has been considered a main task of the European Employment Strategy under the pillar of Equal Opportunities.

The objective of this study is to analyse ways of measuring gender segregation, and to consider specifically how the different types of indices can be used and interpreted. We also have as our task to give recommendations as to how segregation should be measured using current tools and to suggest improvements to existing ways of measure segregation.

It is, however, important first to understand what segregation is, why we try to measure it and what we want to accomplish by these measurements. The following questions therefore need to be answered:

- Is segregation a problem, and if so why?
- What do we learn from making international comparisons of segregation indices?
- Is it useful to make these comparisons on an annual basis?

1.1. Does segregation matter?

Segregation is a result of multidimensional process. It manifests itself in differences in gender patterns of representation within occupations (both classified by industries and by professional status) and within different employment status and employment contract groups. Gender segregation means that women and men to a certain extent work in different occupations or in different sectors or under different contractual terms and conditions.

It is, however, important to question the concept of segregation – not only in interaction with time and place – but also in interaction with the scale of women’s employment and unpaid work. Differences in gender segregation in the labour market cannot be discussed without including a discussion of differences between countries on the scale of women’s employment and the division of work in households - that is the gender segregation in caring, maintenance and bread-winning. With a two-breadwinner model as the norm, as in the Scandinavian countries, part of the work in households is ‘subcontracted’. This applies mostly to former ‘do-it-yourself’-women’s work in the household (knitting, sewing, repairing clothes etc.) which has been taken over by industrial production, and in the main moved to other countries, in the EU and elsewhere, with lower paid labour. Caring for children, disabled and elderly has been taken over by the public sector and mostly turned into employment for women. At the same time, families with small children (or other caring/provision problems) are dependent on family friendly work schedules, which may result in at least one of the two breadwinners in the family (usually the woman) being employed in a family friendly occupation. The amount and content of unpaid work undertaken within the household and by families is thus shaped not only

by the distribution of occupations but also by the distribution of women's occupations. The result is that a high employment rate for women tends to be connected to high gender segregation in the labour market.

In the academic debate on gender segregation there are two traditional standpoints with different specific strategies. One standpoint is that gender segregation reveals real gender differences, as it indicates discrimination towards women in the male-dominated labour market. At the same time, segregation is one of the causes of wage differences, and equal wages will be an illusion as long as barriers into the different labour markets divide women and men and assign them to female and male work tasks. The mechanisms through which the separation of genders is upheld and reshaped also contribute to form gender differences and discrimination in relation to working conditions. The division of work in organisations is another dimension to segregation. It is regulated by gendered mechanisms and processes of power and has influence on different levels and in different spheres of life.

The other standpoint is that gender segregation is not the problem, and that the wage gap could and should be removed by other means than by creating a gender homogeneous labour market. If women and men have the same wage for equal work or work of equal value and the same working conditions, gender segregation would be no problem. Segregation is mainly a result of a different choice of trade and profession between women and men, and the question is if gender segregation is only a disadvantage? The answer is ambiguous and may be dependent on time and space. Gender segregation may in certain situations be an advantage, for instance in the effort to create family friendly work places. For example, experience from Denmark shows that family friendly occupations are mostly found in the female-dominated sectors, as most male-dominated sectors as well as male-dominated unions are still not willing to rethink their systems of work organisation.

History shows that gender integration of occupations has for the most part ended with a return to gender segregation - although with a new structure and up to a point a new content. Inequality in wage and working conditions was persistent (Reskin and Roos 1990; Crompton and Sanderson 1990). It can take great effort and several generations to break down gender segregation of occupations and sectors, and it may prove a particularly difficult task in countries where the labour market participation of women is already high. Substantial reductions in gender segregation will require more extensive measures, including changes in the content and organisation of work in traditionally male- and female-dominated areas, as well as changes in young women's and men's choice of education very early in life.

One conclusion, which we can propose already, is that it is not enough to study segregation. The process of occupational integration and how new gender divisions in work places subsequently develop might be the objective for more intensive future research.

1.2. The link between segregation and the European employment strategy

The European employment strategy to reduce gender segregation can be seen as one tool to stimulate a closer relation between macro economic policy and the workplace level issues. Through the Amsterdam Treaty, the Luxembourg process and the Framework programme for Equal Opportunities, the members of European Union are asked to take gender into consideration in planning, and actual performance in different policy areas. The issue of mainstreaming has to be tackled by the different member states when they draw up the annual National Action Plans (NAP). The subsequent review of the plans by the Commission intensifies the demands on governments to follow-up on the results of the specific actions mentioned in the plans. The gap between plan and action is still quite long in most countries. Pillar four in the Employment strategy includes guidelines on traditional areas in equal opportunities policy such as parental leave, the need for child care and the possibilities of re-entering the labour market after taking time off for family reasons. These matters are addressed in most countries. But in the pillars on employability (I), entrepreneurship (II) and adaptability (III) the gender perspective more or less disappears. It seems particularly difficult to integrate gender within the adaptability agenda, including, for example, aspects of flexibility and security; these issues really reach into the organisations and challenge power relations at work place levels (see Rubery et al. 2001, 2000).

Data from the EU indicates high level of gender segregation in Denmark, Finland and Sweden, and the Council, on the basis of these indices, has recommended that these countries reduce gender segregation in their employment policies for the year 2000. There is a strong element of inconsistency here. The high gender segregation in Denmark, Finland and Sweden is combined with highest female employment rates, and according to the 1999 Joint Employment Plan *'a segregated labour market with high employment rate should be considered preferable to one with less segregation but low employment rate for women'* (JER 1999:70). The high female employment rates in these countries are also combined with a high female education level. This suggests that information on segregation should be combined with information on age and education to enable the Council to evaluate trends as well as levels of gender segregation. It should be noted that it is in any case more difficult to change patterns of segregation in the short term in member states where the majority of the female population is already in jobs. There may be more scope for changing patterns of segregation where there are large supplies of female labour to be mobilised into new job areas or segments.

2. Measures of segregation

To measure segregation, researchers have essentially used index measures. Traditionally, the most commonly used are:

- the Index of dissimilarity (ID);
- the Moir and Selby-Smith segregation indicator (MSS) also called WE Index ¹;
- the standardised or Karmel and MacLachlan Index (IP)²;

A more recently introduced measure, which needs a different kind of calculation, is

- the Index of Segregation calculated according to the marginal matching method ³ (IS or MM).

2.1. Traditional measures

The index of dissimilarity (ID) is based on the understanding that segregation means a different distribution of women and men across the occupational categories; the more equal the distribution, the less the segregation.

The ID-index measures the sum of the absolute difference in women's and men's distribution over occupations.⁴ From the mathematical formula (Box 1 (1.1)) it is evident that the ID-index equals 0 in case of *complete equality* (where women's employment is distributed similarly to men's across occupations) and 1 in the case of *complete dissimilarity* (where women and men are in totally different occupational groups). The ID-index can be interpreted as the proportion of the workforce (persons in employment) which would need to change jobs in order to remove segregation - considering the difference in the female and male share of employment (formula (1.2) in Box 1). A change in the ID indicator is only due to a change in dissimilarity.⁵

¹ Moir H. and Selby Smith J. (1979). WE stands for *Women and Employment* and indicates that this Index was introduced in a OECD report published in 1980 under this title

² Watts, M. (1992).

³ Blackburn M., Jarman J. and Siltanen S., (1993).

⁴ Or over sectors. The discussion here is based on the distribution over occupations – but the discussion based on sectors will be similar.

⁵ A change in dissimilarity can be a result of a change in occupational structure, and as such does not necessarily indicate a more – or less - even gender distribution given the same occupational structure.

Box 1: Index of dissimilarity (ID)

The index of dissimilarity (ID) is according to Blackburn and al., 1993, p.343 defined as:

$$3.1. \quad ID = \frac{1}{2} \sum_i \left| \frac{M_i}{M} - \frac{F_i}{F} \right|$$

The ID-formula can be rewritten as

$$(1.2) \quad ID = \frac{1}{N} \sum_i \frac{1}{2} \cdot \left| M_i \cdot \frac{N}{M} - F_i \cdot \frac{N}{F} \right|$$

Special case: If the female and male share of employment is equal, we have that $\frac{N}{M} = \frac{N}{F} = 2$ and

$$(1.3) \quad ID = \frac{1}{F} \sum_i \frac{1}{2} \cdot |M_i - F_i| \quad \text{and similar:} \quad ID = \frac{1}{M} \sum_i \frac{1}{2} \cdot |M_i - F_i|$$

M represents the total number of males in employment, **M_i** the number of males in occupation *i*
F total number of females in employment, **F_i** the number of females in occupation *i*

In the special case, where women's share of employment equals that of men's, the ID index can be interpreted as the proportion of women (or men) who would have to change jobs to remove segregation (formula (1.3) in Box 1).

The Moir and Selby-Smith segregation indicator (MSS), also called WE Index, is based on the understanding that segregation means that the proportion of women within the occupational categories is different from the proportion of women in employment.

The MSS-index measures the sum of the absolute difference of the proportion of women and the proportion of employed over occupations (formula (2.1) Box 2). The MSS-index equals 0 in *case of complete equality*, and twice the male share of employment ($2 \cdot M/N$) in the *case of complete dissimilarity* (formula (2.2) in Box 2). A change in the MSS indicator may due to a change in dissimilarity or to a change in the proportion of women in employment – eventually to a combination of the two.

Box 2: The Moir and Selby-Smith segregation indicator (MSS)

The Moir and Selby-Smith segregation indicator (MSS) also called WE Index is defined as

$$(2.1) \quad MSS = \sum_i \left| \frac{F_i}{F} - \frac{N_i}{N} \right|$$

By calculations:

$$\sum_i \left| \frac{N_i}{N} - \frac{F_i}{F} \right| = \sum_i \left| \frac{M_i}{N} + \frac{F_i}{N} - \frac{F_i}{F} \right| = \frac{M}{N} \sum_i \left| \frac{M_i}{M} + \frac{F_i}{M} - \frac{N}{M} \cdot \frac{F_i}{F} \right| = \frac{M}{N} \sum_i \left| \frac{M_i}{M} + \left(\frac{F}{M} - \frac{N}{M} \right) \cdot \frac{F_i}{F} \right| = \frac{M}{N} \sum_i \left| \frac{M_i}{M} - \frac{F_i}{F} \right|$$

the MSS-indicator can be reformulated as

$$(2.2) \quad MSS = \frac{M}{N} \sum_i \left| \frac{M_i}{M} - \frac{F_i}{F} \right| = 2 \cdot \frac{M}{N} \cdot ID \quad \text{which shows the relation between the two indexes}$$

Special case: If the female and male share of employment is equal ($\frac{F}{N} = \frac{M}{N} = \frac{1}{2}$) we have

$$(2.3) \quad MSS = ID$$

M represents the total number of males in employment, **M_i** the number of males in occupation *i*
F total number of females in employment, **F_i** the number of females in occupation *i*
N the total number in employment and **N_i** the total number in occupation *i*.

The *MSS-index* can be interpreted as the proportion of the workforce (persons in employment) which would need to change jobs in order to remove segregation. The more equal distribution over occupation for women and men the less segregation. Segregation will however also decline (in this understanding) for a declining male share of employment.

The MSS-index is a multiplication of the ID-index by two and by the male share of employment, and the MSS-index will thus be higher than the ID-index, as long time as the male share of employment is higher than the female share. In the special case where women's share of employment equals that of men's, the MSS-index equals the ID-index (formula (2.3) in Box 2). This shows that as the female share of the work force is growing and becoming more equal to that of men, the two indexes will become more equal. One of the main disadvantages of the MSS-index is that it takes on different values, dependent upon whether it is the proportion of women relative to the overall proportion of women that is the basis of calculation, or the proportion of men relative to the overall proportion of men, that is measured.

The standardised or Karmel and MacLachlan (IP) is also based on the understanding that segregation means a different distribution of women and men across the occupational categories, and the more equal the distribution over occupations for women and men, the less the segregation. The IP-index takes, however, account of differences in the female and male share of employment (formula (3.1) in Box 3).

Box 3: The standardised or Karmel and MacLachlan-index (IP)

The standardised or Karmel and MacLachlan-index (IP) is defined as:

$$(3.1) \quad IP = \frac{1}{N} \sum_i \left| \left(1 - \frac{M}{N}\right) \cdot M_i - \frac{M}{N} \cdot F_i \right|$$

By calculations the IP-indicator can be rewritten in other forms, while

$$(3.2) \quad \left(1 - \frac{M}{N}\right) \cdot M_i - \frac{M}{N} \cdot F_i = M_i - \frac{N_i}{N} \cdot M \quad \text{and similar} \quad \frac{F}{N} \cdot M_i - \frac{M}{N} \cdot F_i = \frac{N_i}{N} \cdot F - F_i$$

$$(3.2) \quad IP = \frac{1}{N} \sum_i \left| M_i - \frac{N_i}{N} \cdot M \right| = \frac{1}{N} \sum_i \left| \frac{N_i}{N} \cdot F - F_i \right| = \frac{1}{N} \sum_i \frac{1}{2} \left(\left| M_i - \frac{N_i}{N} \cdot M \right| + \left| F_i - \frac{N_i}{N} \cdot F \right| \right)$$

$$(3.3) \quad IP = \frac{F}{N} \sum_i \left| \frac{N_i}{N} - \frac{F_i}{F} \right| = \frac{F}{N} \cdot MSS = 2 \cdot \frac{M}{N} \cdot \frac{F}{N} \cdot ID \quad \text{shows the relation between indexes}$$

Special case: If the female and male share of employment is equal ($\frac{F}{N} = \frac{M}{N} = \frac{1}{2}$) we have

$$3.1. \quad IP = \frac{1}{N} \sum_i \frac{1}{2} \cdot (|M_i - \frac{1}{2} \cdot N_i| + |F_i - \frac{1}{2} \cdot N_i|) = \frac{1}{2} \cdot MSS = \frac{1}{2} \cdot ID$$

M represents the total number of males in employment, **M_i** the number of males in occupation *i*
F total number of females in employment, **F_i** the number of females in occupation *i*
N the total number in employment and **N_i** the total number in occupation *i*.

The IP-index can, as such, be interpreted as the proportion of the workforce (persons in employment) which would need to change jobs in order to remove segregation - considering the female and male shares of occupations.

The IP-index equals 0 in *case of complete equality*, and twice the male share multiplied by the female share of employment ($2 \cdot \frac{M}{N} \cdot \frac{F}{N}$) in the *case of complete dissimilarity* (formula (3.4) in Box 3). As the function $\frac{M}{N} \cdot \frac{F}{N}$ (which equals $(1 - \frac{F}{N}) \cdot \frac{F}{N}$) has its maximum for $\frac{M}{N} = \frac{F}{N} = \frac{1}{2}$, the maximum for the IP-index is $\frac{1}{2}$.⁶

The IP-index is similar to the MSS-index and the ID-index (formula (3.4) in Box 3), and the IP-index can, as with these indices be interpreted as the proportion of the workforce (persons in employment) which would need to change jobs in order to remove segregation. The more equal the distribution over occupations for women and men the less the segregation. Segregation for this index will, however, *increase for an increasing female share of employment* (that is a decreasing male share), as the function $\frac{M}{N} \cdot \frac{F}{N}$ is increasing for an increasing female share of employment ($\frac{F}{N}$) as long as this share is less than a half.

⁶ The word 'indicator' may be used in place of 'index' to allow for the fact that the MSS-measure range from 0 to $\frac{1}{2}$ (not to 1).

A change in the IP-index may be due to a change in dissimilarity or to a change in the proportion of women in employment – eventually to a combination of the two. *Less dissimilarity combined with a higher proportion of women in employment may, however, result in a higher measure of segregation.*

The three indexes are related (formula (3.4) in Box 3) and are all dependent on the occupational structure of the economy. The results of the indices may, however, point in different directions for the same development in women's labour market participation. If, for instance, the female share of employment increases (towards $\frac{1}{2}$) while the occupational distribution of women's (as well as men's) employment remains stable, the ID-index will show no difference, the MSS-index will decrease indicating lower segregation, and the IP-index will increase, indicating higher segregation.

None of these traditional indices provide an entirely satisfactory method of measuring gender segregation over time. This is in part because changes in the distribution of women and men across occupations are unlikely to happen in a context of either the occupational structure remaining stable or the female share of the labour force remaining constant. Much of the debate about appropriate measures has revolved around the appropriate way to take into account these simultaneous changes in female employment shares and occupational structure. The final method we will consider, marginal matching, has taken a different approach, choosing to treat the dependence of the measures on occupational structure and the female share of employment as an advantage rather than as a disadvantage.

2.2 Marginal matching

Blackburn, Jarman and Siltanen suggest a fresh approach to the study of segregation called Marginal Matching (MM) – later named the index of segregation (IS).⁷ This approach is based on the same understanding of segregation as the previous mentioned indices. Here segregation, however, means a concentration of women and/or men in certain occupations, such that some occupations can be identified and defined as 'female occupations' and others as 'male occupations'. Thus this approach involves a new definition of gendered occupations. 'Female' occupations are defined as those occupations with the highest ratios of women to men and which together account for the same total number of workers, as there are women in the labour force. The remaining occupations are symmetrically defined as 'male' occupations. The purpose of the new approach was to make it possible to measure segregation in a way which takes direct account of changes in women's share of employment and the occupational composition of employment. The total number of employed can now be divided in:

- the number of women in female occupations
- the number of women in male occupations
- the number of men in female occupations and
- the number of men in male occupations.

⁷ Blackburn et al., 1993.

Blackburn et al. (1993) argues however, that segregation should be measured by statistical measures of association, and suggests a MM-measure (Marginal Match measure) as the well-known measures of association ϕ or τ_B . MM equals 0 in case of *complete equality*, where women's employment is distributed similarly to men's across occupations. MM equals 1 in the case of *complete dissimilarity*, where all women are employed in female occupations and all men are in male occupations.

"MM may be interpreted as a measure of the extent to which gender and gendered occupations vary together - how far female occupations are staffed by women and male occupations by men. This is precisely what is needed for the measurement of segregation, but only with matched marginals is the correlation measure completely satisfactory." (Blackburn and all., 1993, p.349). The argument is that segregation rather than to be thought of "as a quantity, which might be measured as so many 'segometers', it should be understood in terms of the strength of relationship. The stronger the relationship, the greater the degree of segregation." (Blackburn and all., 1993, pp.349-350).

Blackburn, Jarman and Siltanen argue that the MM-index is comparable across situations because it is dependent on women's share of employment and the occupational structure, which should be an advantage compared to the traditional indices.

2.3. Indicators currently used to evaluate gender segregation in the European employment strategy

Among those indicators currently proposed by the EMCO indicators group to monitor gender equality, two indicators measure gender segregation⁸:

- EO3 = Index of gender segregation in occupations (the average national share of employment for women and men is applied to each occupation, the differences are added up to produce a total amount of gender imbalance). This figure is presented as a proportion of total employment. The data source is Labour Force Survey (LFS), ISCO classification of occupations (three digits), annual results available up to 2000.
- EO4 = Index of gender segregation in sectors (the average national share of employment for women and men is applied to each sector, the differences are added up to produce a total amount of gender imbalance). This figure is presented as a proportion of total employment. The data source is the Labour Force Survey (LFS), NACE classification of sectors (two digits), annual results available up to 2000.

The case for measuring sectoral segregation is less strong than for occupational segregation: the NACE 2 digit classification is very broad and there is considerable evidence of occupational segregation within sectors. For these reasons the following analyses concentrate on occupational segregation only, but comparable arguments can be made with respect to sectoral segregation.

⁸ EC, *Joint Employment Report 2000*, p.186.

The EO3 and EO4 are IP-indexes. They have the advantage of the simplicity of calculation but at the same time the disadvantages and problems that have been pointed out in the presentation of the index. A change in the IP-index may be due to a change in dissimilarity or to a change in the proportion of women in employment – eventually to a combination of the two. The change in the IP-index should, however, also be linked changes in the occupational and sector structure in the economy.

It is a problem though, that segregation according to this index *increases for an increasing female share of employment*, and a major problem – a paradox, that *less dissimilarity combined with a higher proportion of women in employment may result in a higher measure of segregation by the IP-index*. Such a result may be considered by many to be counter-intuitive and there is a need, if using the IP index to identify the causes of any change in the index. This overview of the various measures suggests in fact that in order to make comparisons, there is thus a need to use other measures of segregation – or explore more reliable new measures.

3. Methodological issues

3.1. Methodological problems with the use of indices

The scale of women's employment as well as the structure of the labour market differs between the EU-countries. This means that if indices are used to measure gender segregation in the EU – that comparisons are being made across very different entities. We do not know if decreasing segregation means that occupational opportunities are opening up for all women (or men) or if the changes can be attributed to generational change. Furthermore, patterns of segregation can move in different directions and the results, if measured by a single index, may show no change in segregation. Over recent years there is evidence that reductions in vertical segregation, as more educated women move into higher level jobs, have coincided with increasing horizontal segregation, as the female-dominance of some service sector areas increased (Rubery et al. 1999). These trends pull the indices in different directions, resulting in overall low estimates of net changes in segregation, even though the situation for both higher skilled and lower skilled women may be changing markedly.

This tendency for existing measures to obscure changes taking place in the labour market calls for new ways of analysis, where the development of the gender division of occupations is kept separated. Analyses of the importance of self-employment and of part-time employment in processes of segregation are also required.

Problems with the interpretation of the indices, including the IP adopted by the European Commission, have motivated researchers to seek ways of comparing segregation in different countries and over time that is capable of covering periods of deep change in labour market and occupational structures and a rapidly increasing presence of women. The objective is to try to find ways of isolating occupational segregation from the effects of other changes in the labour market.

However, one of the barriers to developing such methods is in fact the classification system of occupations, as we describe below.

3.2. Classification and data problems

These occupational classification systems tend to mirror gender inequalities in the labour market, with traditional male occupations in manufacturing industries specified in detail but female occupations in, for example, health and care aggregated into very broad categories, in practice encompassing a lot of different occupations. For international comparisons, the problem is intensified as which tasks or jobs are included in different occupational categories differs.

It is, therefore, essential to be aware of the fact that all indices and indicators are dependent on the classification of occupations and sectors, and that statistical classifications generally are rigid and conservative (Rubery et al 1999, Blackburn et al 1993). New classifications tend only to be brought in when replacement has become absolutely essential. As the EU member states, despite efforts towards harmonisation, are still developing at different speeds and directions, the conservatism of the classification system means that the classification of occupations and sectors may be more satisfactory for some countries than for others.

We can provide an example of these problems by considering the case of the marginal matching indicator. This indicator, in common with the other indices, is strongly dependent on the classification of occupations. A minor change in classification can have a huge effect on the result. A new and alternative classification may divide one occupation, which was, for example, a weak female dominated into two: a strong female-dominated occupation and a strong male-dominated occupation. This would alter the 'cutting point' between female- and male-dominated occupations and give a very different figure for the MM-indicator. The differences in results between the new and the old classifications will of course be dependent on the size of the workforce in the occupations in question. This can as such be more critical for some EU-countries than for others, thereby distorting comparisons across the EU.

All indices and indicators, as we have already mentioned, are dependent on the scale of women's employment. A large-scale involvement of women in employment will generally mean a higher percentage of employment found in special service sectors (public as well as private) and perhaps a higher percentage employment in parts of industry, but not necessarily located in the same country. This means that the distribution of occupations and sectors will indirectly be dependent on and interact with the scale of women's employment.

It is evident from the mathematical formulae that the ID-index is dependent on the distribution of occupations and thus indirectly on the scale of women's employment. As the MSS-index and the IP-index are just modifications of the ID-index, they are also indirectly dependent on the scale of women's employment, even though they adjust for the female employment rate. The scale of women's employment also influences the MM-indicator directly by influencing and interacting with the distribution of occupations and thus influencing the cutting point between female and male dominated areas.

A comparison across EU countries of gender segregation will always suffer from the problem of finding a satisfactory classification of occupation and sectors which takes account of the differences between the countries, including not only differences in occupational structure but also differences in the scale of women's employment. The problem is if an index can be improved to give a less classification-dependent comparison between EU-countries.

3.3 New methodology based on longitudinal occupational data

As we mentioned in the introduction to this chapter, segregation should be regarded as a result of a multidimensional process. And as such, it is not possible to measure segregation with one single measure. We have to use different types of measures and methods and the segregation indices have to be combined with other types of indicators.

One approach that has been used by both Finnish and Swedish researchers is to take the gender composition of occupations as the starting point with the objective of studying the flows of occupations between different occupational categories. These can be defined as; totally male dominated, medium male dominated, mixed, medium female dominated and totally female dominated occupations. In the Finnish study, gender segregation in the labour market was studied over the period 1970-1990 (Kolehmainen 1997, 1999) The Swedish study covers this period and extends into 1990-1995 (Tyrkkö, Wesberg 2001). The categorisation makes it possible to study the directions of change and the movement of occupations, for example, towards feminisation, masculinisation, neutral desegregation, resegregation and integration.

Occupations were classified according to how they had moved between the categories, in total 25 different categories. Individual workers have not been studied longitudinally; instead occupations have been studied according to how they have moved between categories over time. Over the first twenty years period there seems to have been two different tendencies in the totally male and female dominated parts of the labour market. Segregation was strengthened in the female dominated parts, while the male part seemed to go through a process of decreasing segregation. During the second period 1990-1995 there was a tendency for intensified segregation in the male dominated parts of the labour market and desegregation in the female dominated parts.

In spite of the overall picture of stability in the segregation patterns, there have been substantial changes at the occupational level. Over one third (39 %, 97 occupations) of the 246 occupations belonged to a different category in 1990 than in 1970. Feminisation occurred in 76 occupations as the female proportions increased, and masculinisation in 21 occupations. The largest change was the decrease in the number of totally male dominated occupations. The number of mixed occupations increased, but the number of employed in that category remained low, about 10 percent of all employed.

Through a study like this, it is possible to analyse both the change in the gender composition of occupations and also changes over time in the number of women and men found in occupations classified in certain ways. It is possible to identify the particular group of occupations moving

through feminisation to masculinisation or remaining unchanged and to analyse them in relation to the overall labour market development and economic changes.

4. Results from the analysis of the segregation indices

Now that we have identified the main issues relating to definitions and measures of segregation (see 1.1.), it is time to turn to the results of some statistical calculations, stressing both the outcomes and the problems that arise from the use of the different indices. The object is to show how segregation levels have developed in different member countries during 1995 to 2000, using calculations of the different indices. The calculations use different employment groups as a basis such as; all in employment, all employees, and all in full time employment. That means that we can specifically study the results of excluding the self-employed and part time workers from the calculations.

The indices show segregation in different ways. All indices can be criticised because they produce a measure of segregation that is influenced by elements that cannot in themselves be directly considered (see section 2.1. about the ID, MSS and IP indices). Another common feature is that they are not easy to calculate and the analytical procedure involved is difficult to apply given the way employment are classified in different groups (see section 2.2. about the MM index). Taking this into account, we have to ask the question if it is useful to construct a new index. According to the previous discussions our answer is no. It is probably better to use and decompose the existing indices but with a constant attention to the problems of interpretation and of comparison across time and space.

i) Differences between indices and trends over the period 1995-2000

A simple comparison of the values and of the ranking of the EU countries that result from the calculation of the different segregation indices (ID, IP and WE⁹) deserves some general comments. These comments are based on the values of the different indices and ranks for countries during the period 1995- 2000. The ranking of the different EU countries in 2000 shows the extension of the diversity of the results obtained with the different indices. The ranking of countries according to the level of segregation differs between the WE index on the one side and on the other side the ID and the IP index (see appendix figure 1).If we rank the countries in 2000 according to the value of the IP and the ID index the list has only slight changes (in the top and bottom of the list we find the same countries; in the middle some changes occur but mainly just one place- France moving two and Ireland three places.

⁹ Calculations referring to the MM index are not considered here. These are difficult to undertake using standard statistical techniques as interpolations within occupational categories are needed. Previous results (Rubery et al. 1999) have shown little difference in the indicated level of segregation and rankings between the MM index for European member states and the ID or the IP although the method could yield different results in other contexts.

When using the WE index (as compared to the rank according to IP and ID indices) the ranking of the countries changes. Spain and Luxembourg are countries where the changes are profound. They appear in the bottom of the rank when the WE index is used instead of in the top when using the other two indices. Denmark and Sweden appear in the middle of the rank using the WE, while with the other two indices they are found at the bottom, with high segregation levels.

ii) Relationship between the level of segregation and the female employment rate

If we look at the relationships between segregation indices and women's overall employment rate (appendix figure 2) we find a strong upward relationship between women's employment rate and the value of the index for ID and IP but no such relationship for the MSS index.

iii) Impact of removing part-time workers from the indices

Comparisons using the ID and IP indices of levels and rankings between all in employment, all employees, all in FT employment and all FT employees also reveal important issues for the study of segregation.

There are major differences in level and rank for indices based on those in full-time employment only compared to calculations including both full and part-time categories: particularly strong reductions in measured levels of segregation are found for Netherlands, UK and Germany, all high part-time countries; weak reductions or increases are visible for Italy, Greece, and Finland, all low part-time countries. For Spain and Portugal, being low part-time countries, their relative position in EU ranks sank dramatically compared to the ranking related to all employment. There are also differences in the relative position of countries according to calculations comparing all employees with full-time employees. Belgium and Germany improve their relative position while Spain and Denmark worsen their positions. Greece and France are interesting cases as there are different results, according to whether the ID or the IP index is considered.

iv) Impact of removing the self-employed or those in agricultural employment from the indices

Taking out the self-employed from total employment also changed the relative position of the member states: Denmark, Ireland and the UK perform better on segregation terms when only employees are considered while Spain and Portugal have a worse performance when self-employed not are considered. Taking out the self-employed from the indices for those in full-time employment also changes the relative position of some of the Member-States: Ireland and Denmark improve their relative position while for Germany the position clearly deteriorates. However, it would not be appropriate to conclude that self-employment is less segregated than direct employment as we know that, for example, women are less likely to be employers among the self employed and may in fact play a more subordinate role in family businesses.

Taking out the employed in agriculture (appendix table 1) contributes clearly to a worsening of the Portuguese situation in relative terms. The opposite development can be seen in Ireland where the situation seems to improve. This contrast is interesting as the two countries have an important percentage of employment in agriculture.

v) Relationship between absolute values of the indices and EU member state rankings.

The absolute values of the indices and their relationship to the relative position of the countries in the European ranking also deserve to be noted. If we take the IP index (which is the indicator used by the EU as previously referred) as an example, the amplitude of the variation of the index between the 15 Member-States is rather small. The absolute value of this index is the smallest of the three under analysis, 25.17% for the EU for all in employment in year 2000. In fact, the difference between the best performance (Greece: 21.28%) and the worst performance (Finland: 30.06%) is not that high. Also the values of the IP index show that quite similar differences on the value of the index can imply rather different places in the ranking of the countries. For example a difference of 3.3 percentage points between Italy and Spain for year 2000 results in ranks for these countries, respectively, of second and third, while a difference of 3.12 percentage points between Spain and Denmark results in ranks for these countries, respectively of third and thirteenth.

It is also the case that relatively small changes in the indices can correspond, according to the group of workers to which it is being applied, to different consequences for the relative position of the member state. For example, if we consider the differences in the IP index 2000 applied to total employment and to all in full-time employment, we find that in Spain a decrease of 1.28 percentage points went together with a deterioration in ranking of four places. However, for Italy, a decrease of 0.92 percentage points went together with the maintenance of second place in the ranking. In Portugal an increase of 0.24 percentage points in the index went together with a strong deterioration in its relative place in the EU ranking (from 6th to 14th place).

Table 1. IP Index (various measures) by Member State for 2000

	All in Employment		All in FT Employment		All Employees		All FT Employees		All in Employment exc. Agricultural Occupations	
	%	R	%	R	%	R	%	R	%	R
Austria	27.26%	12	24.80%	11	29.83%	14	27.02%	12	28.54%	12
Belgium	26.79%	8	24.07%	9	28.57%	11	24.07%	4	26.89%	8
Germany	27.20%	11	23.33%	6	28.41%	10	24.90%	6	27.53%	9
Denmark	27.97%	13	25.91%	12	28.19%	8	26.57%	11	28.14%	11
Spain	24.85%	3	23.57%	7	27.23%	7	25.79%	10	25.70%	3
Finland	30.06%	15	29.90%	15	30.82%	15	30.94%	15	30.98%	15
France	27.03%	10	24.27%	10	28.32%	9	25.78%	9	27.56%	10
Greece	21.28%	1	20.93%	3	26.05%	2	25.71%	8	24.14%	2
Ireland	26.96%	9	24.06%	8	27.00%	5	25.01%	7	26.88%	7
Italy	21.55%	2	20.63%	2	23.75%	1	22.87%	3	22.30%	1
Luxembourg	25.71%	5	23.17%	5	27.21%	6	24.74%	5	25.88%	5
Netherlands	25.51%	4	15.06%	1	26.43%	3	15.97%	1	25.79%	4
Portugal	26.45%	6	26.69%	14	29.20%	12	28.95%	14	28.55%	13
Sweden	29.04%	14	26.24%	13	29.36%	13	27.21%	13	29.16%	14
UK	26.73%	7	21.84%	4	26.99%	4	22.47%	2	26.75%	6
EU	25.17%		21.96%		26.79%		23.85%		25.88%	

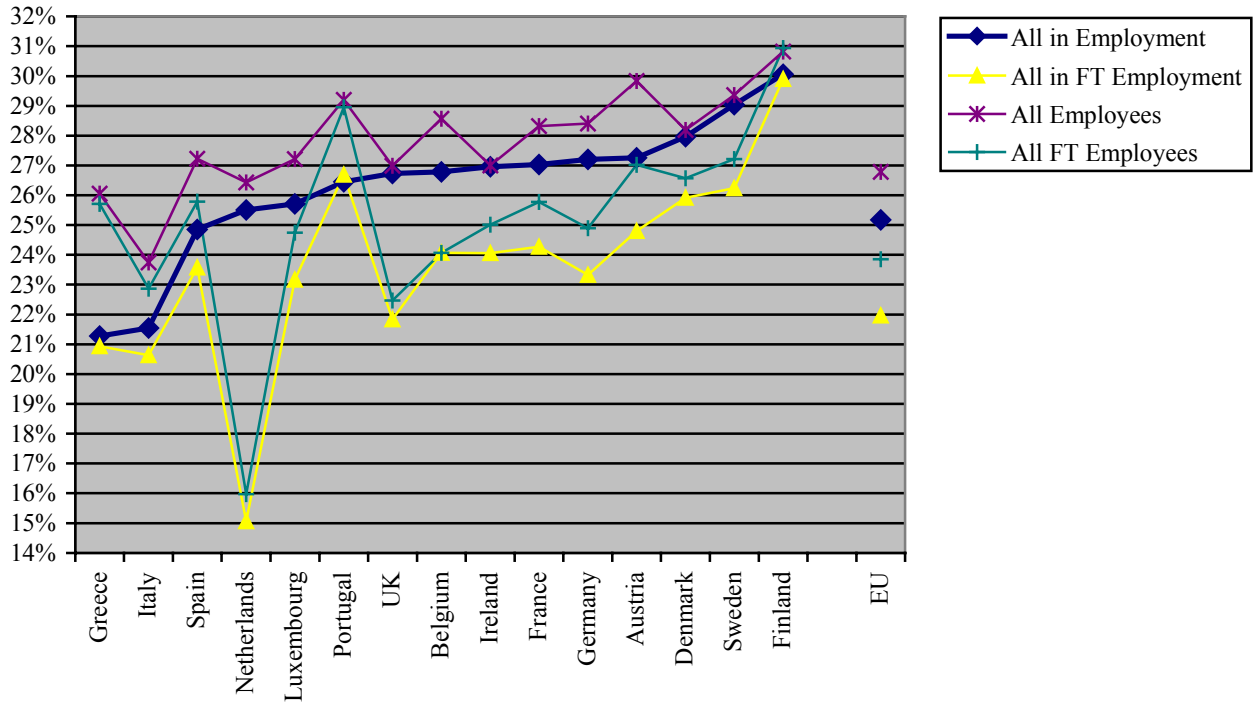
Source: ELFS 2000 (own calculations)

Table 2. ID Index (various measures) by Member State for 2000

	All in Employment		All in FT Employment		All Employees		All FT Employees		All in Employment exc. Agricultural Occupations	
	%	R	%	R	%	R	%	R	%	R
Austria	55.31%	11	54.14%	10	60.39%	14	59.01%	14	57.95%	13
Belgium	54.88%	9	54.52%	11	58.14%	11	54.52%	7	54.95%	8
Germany	55.25%	10	52.19%	6	57.33%	10	54.83%	8	55.89%	10
Denmark	56.19%	13	54.66%	12	56.43%	6	55.27%	9	56.43%	11
Spain	53.12%	4	52.78%	8	57.30%	9	56.62%	12	54.55%	6
Finland	60.29%	15	60.43%	15	61.65%	15	62.06%	15	62.03%	15
France	54.64%	8	51.92%	5	56.91%	8	54.39%	6	55.54%	9
Greece	45.28%	1	45.19%	2	54.38%	4	54.23%	5	51.93%	2
Ireland	55.83%	12	53.65%	9	54.39%	5	52.64%	4	54.79%	7
Italy	46.32%	2	46.39%	3	49.47%	1	49.40%	3	47.78%	1
Luxembourg	53.84%	6	52.50%	7	56.56%	7	55.61%	10	53.91%	4
Netherlands	52.13%	3	44.75%	1	53.74%	2	46.77%	1	52.63%	3
Portugal	53.41%	5	54.69%	13	58.81%	13	58.76%	13	57.87%	12
Sweden	58.19%	14	55.04%	14	58.73%	12	56.14%	11	58.38%	14
UK	54.03%	7	49.28%	4	54.18%	3	49.24%	2	54.00%	5
EU	51.47%		48.62%		54.20%		51.69%		52.80%	

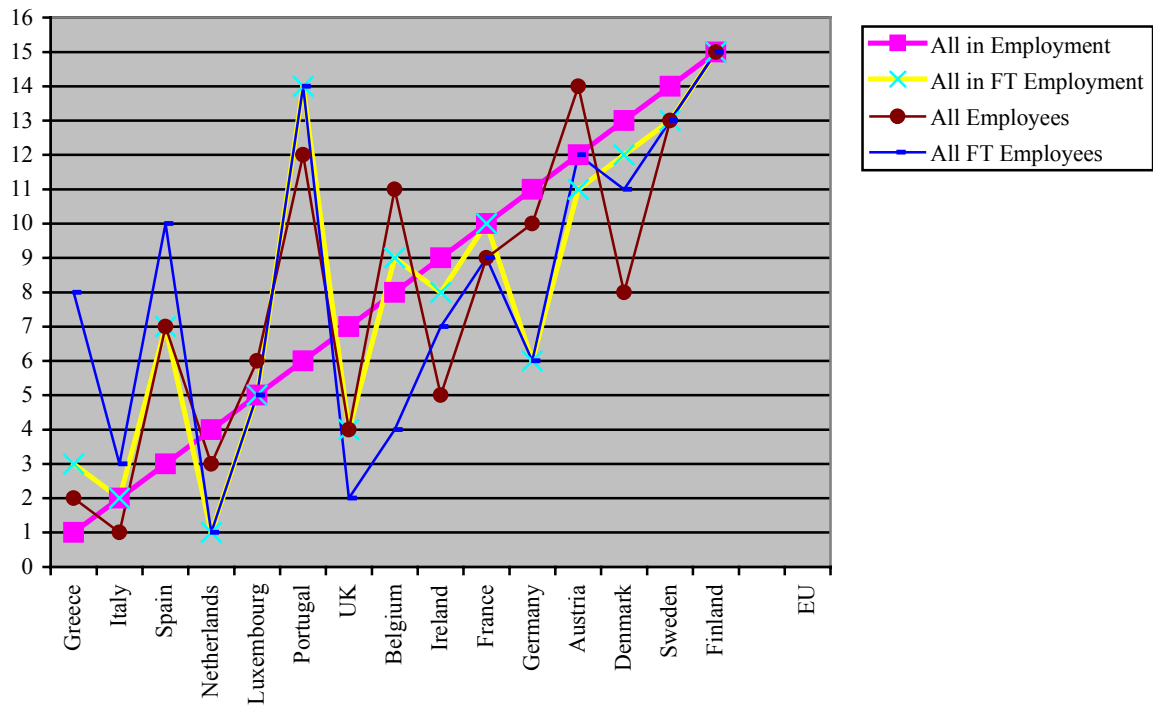
Source: ELFS 2000 (own calculations)

Figure 1. The IP-index for 2000.



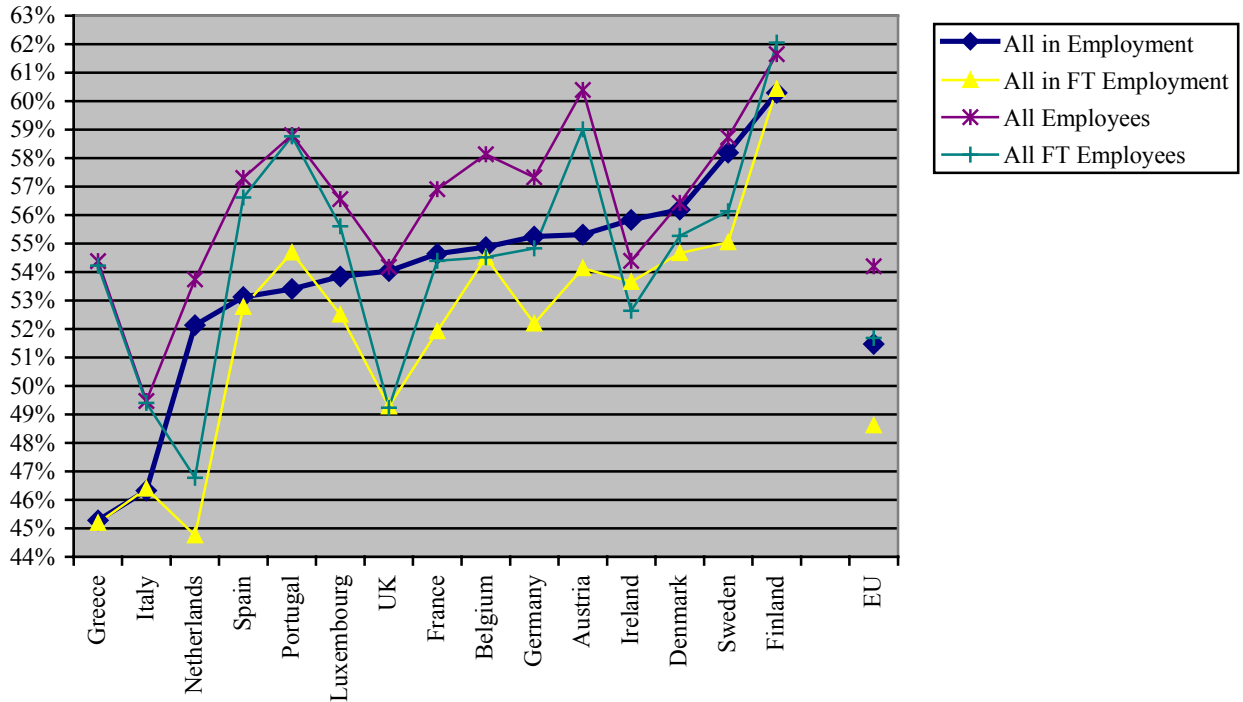
Source: ELFS 2000 (own calculations)

Figure 2. The IP- rank for 2000.



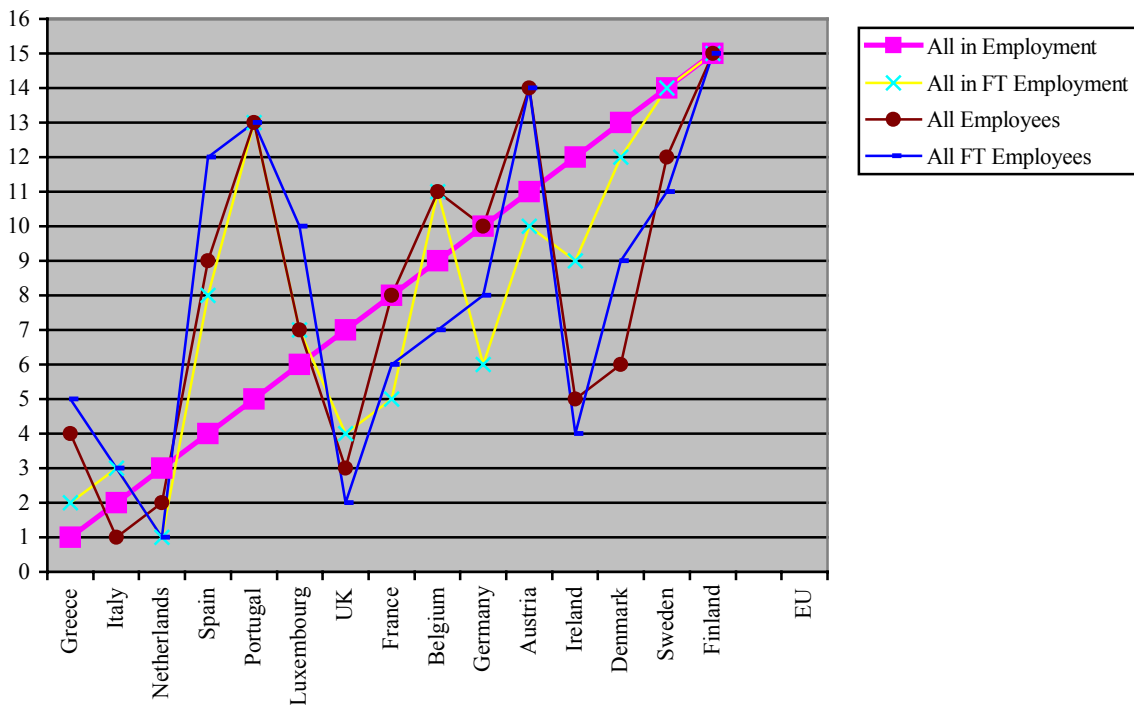
Source: ELFS 2000 (own calculations)

Figure 3. The ID-index for 2000.



Source: ELFS 2000 (own calculations)

Figure 4. The ID - rank for 2000.



Source: ELFS 2000 (own calculations)

vi) Factors associated with changes in the value of indices

Given the diversities that have been noticed, it is clear that all analysis must be undertaken with care and that it is important to go behind the relative values (and the associated ranks) of each index. It appears of utmost importance to make an analysis not only referring to one year but to the (more or less) recent trend of the index but also to the elements that stand behind the tendency. In more concrete terms, it is important to understand if the observed changes refer essentially to changes in the occupational structure or in the share of men and women in employment.

The decomposition of changes of the ID index adds important elements to the analysis of the changes on grounds of segregation within EU countries. The overall level of segregation decreased in the EU between 1997 and 2000 but this development was caused both by changes in the occupational structure and by changes in the female share of occupations. Still, it is important to stress that this last effect has been the stronger; at a national level these dynamics appear to be differentiated. In some countries the tendency of the EU is also the one that prevails at the national level. That is the case of Belgium, France Netherlands and the UK. In Sweden the effect of changes in the structure of occupations has been stronger than changes in female shares within occupations. Ireland and Portugal had a rather different evolution where the ID increased between 1997 and 2000 by the joint effect of structure and share changes both acting to increase the index. In Ireland this was due primarily to the effect of share and in Portugal primarily to the effect of occupational structure. Austria and Italy had a decrease in the index associated with the changes in the share of occupations (Greece, had a similar negative share effect but kept a constant index value) as the occupational effect acted in the sense of increasing segregation. Spain and Luxembourg had a similar divergent evolution of the occupational and share effects but segregation increased as there was a stronger positive occupational effect than a negative share effect. Denmark and Finland had a share effect which contributed by increasing segregation but an occupational effect acting to reduce segregation. The final outcome was favourable in Denmark (decrease of segregation) but not in Finland where the ID-index increased.

What this description tells us is to stress the importance of understanding how segregation is developing, and the importance of knowing the variables that are mainly responsible for that evolution. The data also indicate that a single index is unable to make sufficient differentiation between countries as the variation between countries is almost at the same level as variation within a country over a small period of years (1997-2000).

Figure 5. Decomposition of Overall Change in the ID (97-2000) (Change due to Structure, Change due to Share Effects, Residual)

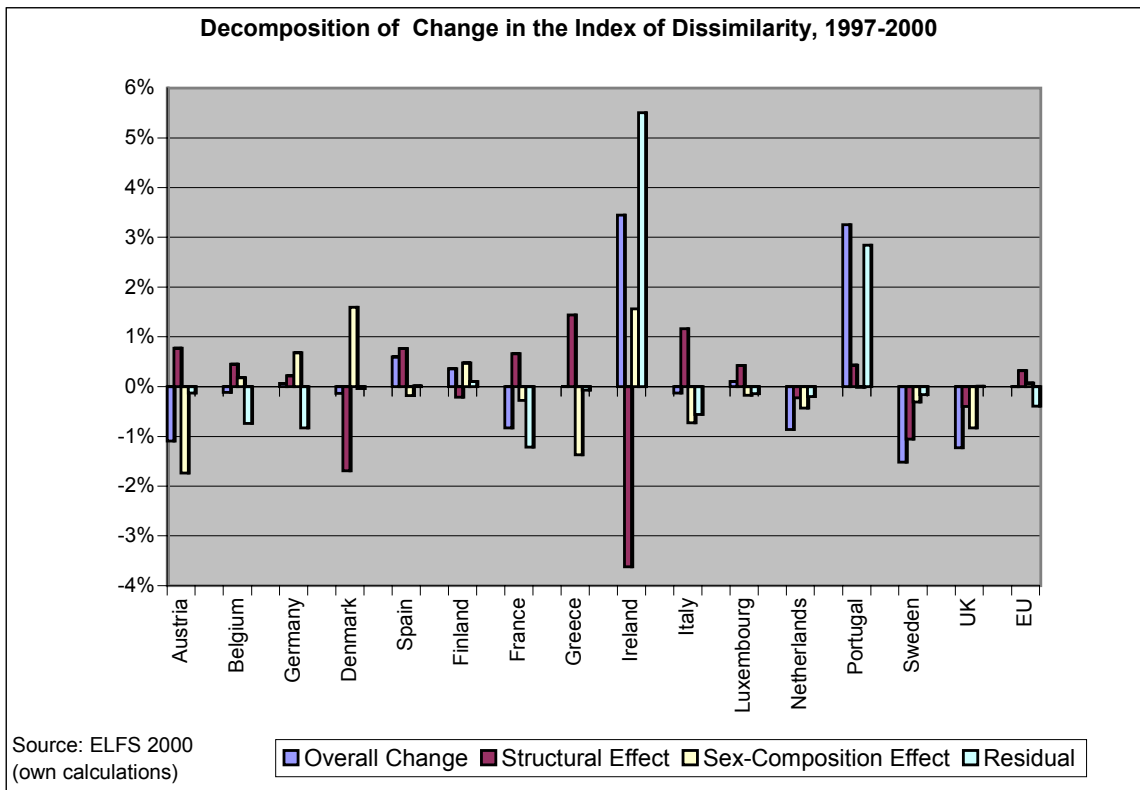
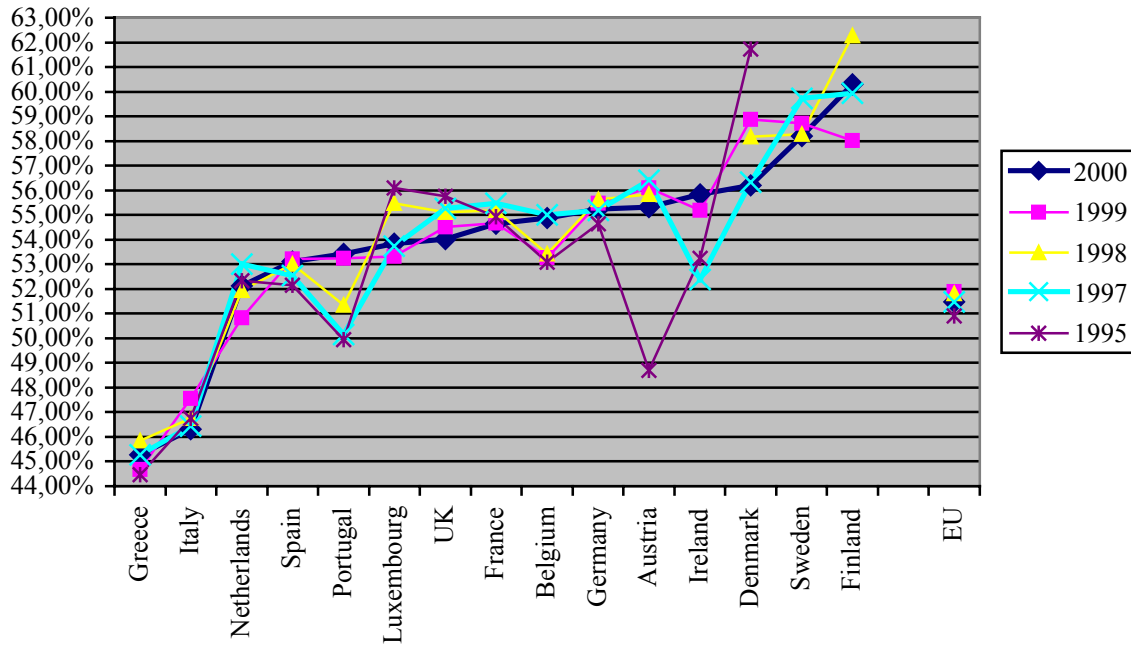
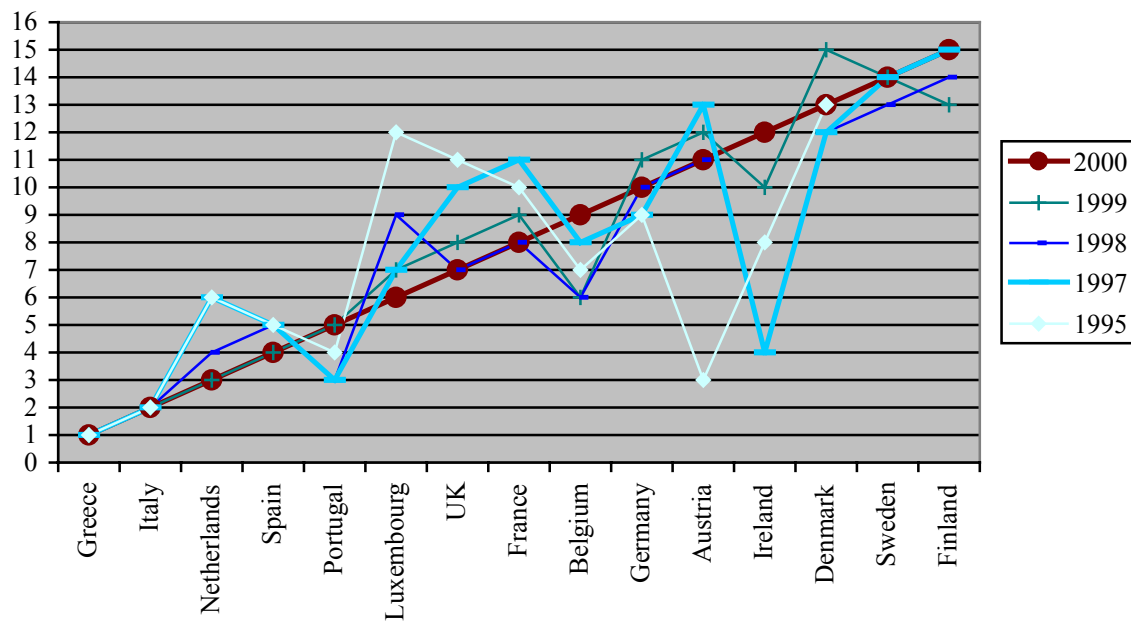


Figure 6. ID index for all in employment in 1995,1997,1998,1999 and 2000 for EU-countries ordered by the ID-index in 2000.



Source: ELFS 2000 (own calculations)

Figure 7. Rank for ID index all in employment in for 1995,1997,1998,1999 and 2000 for EU-countries ordered by the rank of the ID-index in 2000.



Source: ELFS 2000 (own calculations)

5. Key issues in the analysis of segregation

From our comparisons of segregation across time and space, and using different statistical indicators and different definitions of the employed population, we can now suggest some of the important divisions in labour markets that need to be taken into account when comparing segregation levels.

5.1. Occupational segregation and the female employment rate

The likelihood of a positive relationship between the level of female employment and the level of segregation should be recognised. Appendix figure 2 indicated the existence of a linear relationship for current data and in 1995 a simple linear regression analysis showed a correlation coefficient of 0.84 for the ID-index of segregation and the female employment rate (Rubery et al. 2000). Denmark, Finland and Sweden's high female employment rates are thus combined with high gender segregation while Greece and Italy's low employment rates are combined with low gender segregation. As we have already noted, the Council of Ministers recommended on the basis of this evidence that Denmark, Sweden and Finland take action to reduce gender segregation in contradiction to the 1999 Joint Employment Report which states that *'a segregated labour market with high employment rate should be considered preferable to one with less segregation but low employment rate for women'* (JER 1999:70). The recommendation to Denmark, Sweden and Finland is based on the calculation of an index (or indicator) – and not on an analysis of problems for equality at labour market in these countries.

5.2. Segregation indices as measures of long rather than short-term change.

Taking a long-term perspective, we find that gender segregation, measured for example with the ID index has shown a decrease (Rubery et al 1999, Jonung 1997, 1999, Gonäs, Spånt 1997). However year to year changes in segregation indices should not be used to monitor progress in gender equality, at least in part because the causes of changes in indices include changes in occupational structure and changes in the overall share of women in the labour force, and not just changes in gender shares within occupations. The focus on the long term does not mean an acceptance of the slow pace of change; instead the issue is how to increase the speed of change and support integrative tendencies.

5.3 Segregation and part-time work.

The growth of part-time work is often cited as a factor that has maintained or increased gender segregation. Not only do part-time jobs tend to be concentrated in female-dominated segments but also the increased importance of part-time jobs both tends to deter the entry of men and increase measures of segregation, if part-time jobs are treated as directly equivalent to a full-time job. On that basis the increase in female shares in occupations may be greater than their share of the volume of employment, and if this occurs particularly in female-dominated segments, the gender segregation index will increase. These effects will be less strong if part-time jobs are

spread through the occupational structure and are not over represented in high female occupations. Figures 1 (IP index) and 2 (ID index) show how the indices of segregation tend to decrease once part-time workers are excluded from the calculations. The downward turn is particularly notable in countries with a large proportion of part-time workers as in UK, Netherlands and Germany. The indices of segregation used for monitoring gender equality under the European employment strategy should be calculated with and without part-time workers, in order to provide more information on the role of flexibility in shaping gender patterns of segregation in the labour market.

5.4. Segregation and the division between employees and the self-employed

When excluding the self employed from the calculations, the IP and ID indices changes in almost the same way as when part timers were excluded from all in employment (Figure 1, 2). The ID index shows larger variations than the IP index. But in both cases it is Netherlands, Portugal UK, Austria and Ireland that show the largest differences in relation to all in employment. On the other hand there are countries where like Greece and Italy where the indices barely changes at all and a country like Sweden with a high ID-value for all in employment where the indices changes very little as we exclude part timers and self employed. This seems to be the case also for the other Nordic countries, where part time work has a larger impact on the segregation level than self-employment. Southern countries tend to record higher segregation for employees than all in employment. Greece shows the largest increase in segregation level when excluding the self-employed from the analysis (ID index). Also Portugal, Italy and Spain show these differences between full time employment and full time employees. These differences point to the obvious fact that the occupational distribution among self-employed women and men differ from the distribution among employees, to a larger extent in these countries than for example in the Nordic countries. That is a result that might be related in part to the importance of the agricultural sector in the economy as well as to the role of family businesses in services. However, as we have noted above, the main division among the self-employed by gender may not be captured by occupational differences but to the shares who are employers, rather than own account self employed, or gender divisions in who assumes the role of ‘boss’ within a family business

5.5. Sectoral distributions and segregation – agriculture as an example

When agriculture is excluded from the analysis, the IP and ID values increased slightly for EU as a whole as well as for most member countries (appendix table 1). The increase is not very large on an overall level but is more significant for individual member states. Agriculture is one sector where there are relatively few defined occupational categories. Where there are fairly equal proportions of men and women involved in agriculture the effect of including agricultural employment is likely to be to reduce segregation levels. However, where agriculture is a male-dominated sector, the impact of inclusion may be to increase segregation. Portugal, Greece and Finland, for example, show increased levels of segregation when agricultural occupations are excluded from the analysis. Ireland, shows a decrease, reflecting the high importance of agriculture in this country but also the predominance of men (Rubery and Fagan 1993). The example of agriculture indicates the sensitivity of indices to sectoral composition, to differences

in the gender division of labour within sectors across Europe and the impact of occupational classification systems.

5.6. Generational differences and segregation

Age or rather generational developments should be studied in order to track the effects of changing educational levels, changing aspirations and also changing attitudes of employers towards new entrants. However, the lack of long-term historical data on the patterns of occupational segregation by age creates some practical difficulties. This is because there are both lifecycle as well as generational factors in the allocation of workers to jobs. Younger people may show lower levels of occupational segregation than older groups but this could have been true also in the past. It has certainly been a long standing feature of gender inequalities in earnings to increase with age, so a greater equality among young people today can not really tell us what will happen when today's younger cohort becomes middle-aged or enters older age brackets. Alongside lifecycle patterns there is clear evidence, however, of generational change: the average educational level of younger (age 25-34) women is higher than that of younger men in many countries (Rubery et al 1999 p 88). Looking at older age groups (age 55-64), we find the situation is reversed.

The continuation of gender segregation can of course be linked to differences in women and men's choice of education and career path (NAP 1998, Sjørup and Henningsen 1997, Emerek and Ipsen 1997). Policy intervention at a young age is therefore potentially crucial. However, some countries, such as Denmark have tried, but with little success to pilot women's choice of education into male-dominated areas by reducing the number of educational places in areas with special appeal to women, and by establishing special education recruitment schemes for women into male dominated trades (Holt 1987). The male-trade strategy 'died' in the late 1980s in Denmark, though there has since been some success in training unemployed women into traditional male-dominated occupations and activating men into traditional female occupations (Petersen 1997). The Danish labour market remains, however, still highly gender segregated.

There have been major changes in the shares of women entering some previous traditionally male education areas, such as economics and medicine, and these examples of desegregation seem to be linked to processes of desegregation on the labour market. Women do not, however, automatically adopt male-roles within these professions; they create their own roles as well as they chose certain specialities (Henningsen and Sjørup, 1997). The problem is to know how to intervene in this process; whether one first needs to change the employment opportunities for women or first to change their educational choices.

5.7 Vertical segregation

So far our analyses have concentrated on segregation measures which include both vertical and horizontal dimensions to segregation. There has been a much more limited development of measures of vertical segregation. If we use the one-digit ISCO classification, which divides the occupational structure into ten broad areas, we can look at female representation in higher level jobs. The ISCO classification is constructed to divide occupations both in a vertical and a

horizontal dimension. To group 1 in the ISCO classification belong occupations like legislators, senior officials and managers, all in very top positions in organisations. To group 2 belong professionals from different areas. It is a much more diverse group, where for example in the group teaching professionals both university professors and primary and pre-primary teachers are included on the 1-digit level (although whether primary or pre-primary teachers are considered professionals or associate professionals does vary by member state). On this level it becomes very difficult to use the group as it consists of occupations with varying educational attainments. Group 3 includes technicians and associate professionals. That is also a very diverse group when it comes to educational levels and to job tasks.

Table 2 shows the share of women in higher level jobs, measured as the share of all women in employment having an occupation in ISCO 1-2. For EU as a total this share is 19.58 percent. Of the member countries the highest share is found in Belgium with 32.10 percent and the lowest in Portugal with 12.77 percent. Ireland, Finland and UK have between 28-29 percent of women in ISCO 1-2. Germany, France and Denmark are found at the other end of the distribution with female shares between 14-15 percent. The reasons why we find these large differences involve a number of factors, including different approaches to the grading and classification of key jobs such as teachers and nurses (Rubery et al. 1999), differences in the division of labour within organisations between managers and other workers, differences in the structure of the economy (for example between the public and private sectors) as well as differences in gender relations and equal opportunities.

One example can be given by using the corporate managers ISCO 120, where women's share of all employed for EU is 17,1 percent for 2000. In five of the member countries the female share is 10,0 percent and under, as in UK, Sweden, Luxembourg, Ireland and Greece. There are very few individuals in this group in some countries, so the material has to be treated carefully. For three countries the female share is 20 percent and over- Austria, Netherlands and Italy. The overall impression is of a male dominated occupation, but where the national variations only can be explained by using a more detailed analysis. Why the female share of corporate managers in UK is only 7.5 percent in 2000 has to be explained by methods other than statistical analysis.

Table 3: Share of Women in Higher Level Jobs (as share of all women in employment)

	2000	Rank	1999	Rank	1998	Rank	1997	Rank	1995	Rank
Austria	16.5%	11	16.0%	11	16.0%	10	15.3%	11	13.2%	12
Belgium	32.1%	1	33.5%	1	33.5%	1	32.9%	1	32.0%	1
Germany	14.5%	14	14.6%	13	14.6%	12	14.2%	14	13.4%	11
Denmark	15.4%	12	14.4%	14	13.9%	13	14.9%	12	12.9%	13
Spain	22.1%	6	22.7%	6	23.9%	5	23.8%	5	22.1%	4
Finland	28.4%	3	27.8%	3	24.9%	3	26.1%	4	:	:
France	14.9%	13	14.9%	12	15.0%	11	14.7%	13	15.1%	9
Greece	21.9%	7	21.9%	7	23.4%	6	21.2%	7	20.6%	5
Ireland	29.1%	2	29.0%	2	:	:	28.7%	2	29.0%	2
Italy	16.8%	10	17.5%	10	17.3%	9	16.2%	10	16.0%	8
Luxembourg	19.4%	9	21.1%	8	17.9%	8	20.1%	8	16.9%	7
Netherlands	24.3%	5	25.3%	5	24.4%	4	23.4%	6	20.3%	6
Portugal	12.8%	15	13.0%	15	12.5%	14	13.2%	15	14.3%	10
Sweden	20.8%	8	19.7%	9	19.5%	7	19.8%	9	:	:
UK	27.9%	4	27.5%	4	26.9%	2	27.0%	3	26.7%	3
EU	19.6%		19.7%		19.4%		19.2%		18.4%	

Note: Higher Level defined as ISCO 1-2

1998 - No Data for Ireland; 1995 - No Data for Sweden and Finland

Source:ELFS 2000 (own calculations)

As can be seen in table 3 and 4, the public sector plays a different role for women and men all over EU. The gender gap in the concentration of employees in public sector is high in countries with a high female employment rate. In countries with a high proportion of women in the public sector, women also tend to belong to the professional groups in this sector and occupy leading positions. Countries which had a low share of women among corporate managers, like UK, do not necessarily have an overall low share of women in ISCO 1-2 (the UK overall share is 27.9 percent compared to the EU as a whole of 19.6). The low share of women as corporate managers may be compensated by women taking part on higher levels in other sectors of the economy. One hypothesis could be that it is easier for a woman to have a leading position and combine work and family in a public sector organisation where there already is a high proportion of women, than in a private corporation. But that is an hypothesis that has to be tested. In general there is a need to pay more attention to processes of vertical segregation and to develop more satisfactory ways of looking at changes over time and differences across countries.

Table 4: Concentration of employees in the public sector, 1997-2000

	% women's employment								% men's employment							
	1997		1998		1999		2000		1997		1998		1999		2000	
	All	PT	All	PT	All	PT	All	PT	All	PT	All	PT	All	PT	All	PT
Austria	33.7	32.5	34.6	31.3	33.7	31.4	34.6	32.3	17.9	31.5	17.6	28.4	17.2	25.8	16.9	21.5
Belgium	49.6	56.7	49.3	56.8	49.6	57.5	49.5	57.0	23.1	34.2	22.7	31.3	23.3	39.1	23.4	40.5
Germany	39.9	39.3	40.4	39.3	40.4	39.5	40.2	40.1	19.9	31.2	19.9	31.4	19.8	31.5	19.9	31.3
Denmark	53.0	58.8	51.6	57.2	51.4	55.4	52.0	55.4	20.1	30.1	19.9	29.1	20.2	32.5	19.9	27.7
Spain	33.1	25.4	32.9	24.9	32.4	23.9	31.3	23.3	15.4	26.2	15.2	29.1	15.1	25.0	15.3	28.3
Finland	49.0	42.5	49.9	40.8	47.7	38.2	48.1	38.2	16.4	21.6	15.2	17.5	16.3	24.5	15.6	21.7
France	43.8	45.4	43.7	44.5	43.5	44.2	43.9	44.9	21.9	40.7	22.3	39.5	21.8	40.1	21.5	39.5
Greece	27.4	21.0	28.2	20.7	28.4	23.9	28.2	23.7	17.1	11.4	17.2	14.3	17.5	19.9	17.4	15.9
Ireland	40.9	46.7	35.6	36.6	36.1	36.7	36.2	36.9	16.9	31.5	15.2	22.7	14.7	19.9	14.5	20.3
Italy	36.2	24.3	37.9	28.0	37.8	29.1	37.8	29.1	19.1	24.2	20.4	26.9	20.1	29.8	19.8	30.4
Luxembourg	40.1	42.4	42.0	47.2	44.3	44.6	43.0	45.7	24.8	62.2	25.6	35.9	24.7	30.1	26.5	47.1
Netherlands	48.1	51.6	46.2	50.3	46.8	51.0	46.9	51.0	22.9	28.3	22.2	28.9	22.9	29.8	21.9	29.6
Portugal	32.0	18.2	26.1	11.4	27.6	13.7	26.8	10.6	15.0	9.6	13.2	10.5	14.4	9.9	14.6	9.3
Sweden	56.9	61.7	56.6	62.4	57.1	62.6	56.3	62.1	19.5	36.3	19.2	29.2	18.7	30.8	19.1	26.8
UK	43.7	44.8	43.9	46.0	44.1	46.1	45.0	46.3	18.3	25.4	18.5	26.8	19.0	27.3	19.1	26.4
EU 15	41.1	42.7	41.1	42.5	41.1	42.5	41.2	42.7	19.2	29.0	19.4	29.1	19.4	29.8	19.3	29.3

Note: public sector employees are defined as employees who work in the following sectors: public administration, defence and compulsory social security; education; health and social work ; other community, social and personal service activities; extra-territorial organisations and bodies (NACE REV 1cats L,M,N,O and Q)

Source: European Labour Force Survey 2000 (own calculations)

Table 5: Absolute Gender Gap in the concentration of employees in the public sector, 1997-2000 (All employees) vs. Female Employment Rates (working age)

	Absolute Gender Gaps (p.p)				Employment Rates (%)			
	1997	1998	1999	2000	1997	1998	1999	2000
Austria	15.9	17.0	16.5	17.6	58.5	59.0	59.7	59.6
Belgium	26.4	26.6	26.3	26.2	46.7	47.5	50.2	51.9
Germany	20.0	20.5	20.6	20.3	55.2	55.6	57.0	57.8
Denmark	32.9	31.8	31.2	32.1	69.4	70.3	71.6	72.1
Spain	17.7	17.7	17.3	16.0	33.5	34.8	37.3	40.3
Finland	32.5	34.7	31.3	32.5	59.2	60.5	64.6	65.2
France	21.9	21.3	21.6	22.4	52.1	52.9	53.5	54.8
Greece	10.3	11.0	11.0	10.8	39.1	40.3	40.7	41.3
Ireland	24.0	20.4	21.4	21.7	44.7	48.2	51.4	53.2
Italy	17.1	17.6	17.7	18.0	36.2	37.1	38.1	39.3
Luxembourg	15.3	16.4	19.6	16.5	45.7	45.7	48.9	50.4
Netherlands	25.2	23.9	23.9	25.1	56.9	58.9	61.3	63.4
Portugal	17.0	12.9	13.2	12.2	55.5	58.3	59.6	60.4
Sweden	37.4	37.5	38.4	37.2	66.9	66.4	69.0	69.7
UK	25.5	25.4	25.1	25.9	63.0	63.2	63.9	64.5
EU 15	21.9	21.8	21.7	21.9	50.4	51.2	52.6	53.8

Note: public sector employees are defined as employees who work in the following sectors: public administration, defence and compulsory social security; education; health and social work ; other community, social and personal service activities; extra-territorial organisations and bodies (NACE REV 1cats L,M,N,O and Q)

Source: European Labour Force Survey 2000 (own calculations)

5.8 Gender segregation in unpaid work

One of the important results from a benchmarking study (Plantenga, Hansen 1999, Gonäs 1999) undertaken by the expert group on gender and employment was that the largest gender differences were found in the gender division of unpaid work. There is therefore a need to consider gender segregation in this area of work alongside gender segregation in paid work.

5.9 Stability and change -the north – south divide

It is the Northern member states, specifically Finland and Sweden that have repeatedly been asked by the Commission through the employment guidelines to take actions against the gender segregation in the labour market. It is among the southern countries where the segregation levels are lowest, such as Greece, Italy, and Spain. There is some evidence of a convergence in segregation levels for some Southern/Northern countries: for example there is a clear upward shift of the segregation levels in some low segregation countries such as Portugal while Denmark, a high segregation country, is moving towards less segregation. However to regard this as a process of convergence may be inappropriate: it is possible to have the same level of segregation as measured by indices while experiencing very different processes of employed restructuring and very different patterns of gender relations. Thru any evidence of convergence in segregation indices must be investigated with respect to the causes of the convergence which may vary between member states.

Regional differences should also be considered, particularly in member states such as Italy or Germany where there are clear differences in the position of women between Northern and Southern Italy and East and West Germany. Regional analysis can also help to clarify generational changes. In a regional analysis (NUTS II –level) of activity rates for women and men in Europe the gender differences for young (age 15-24) women and men were not so profound as for middle aged (age 25-54) or elderly (age 55-) women and men (Gonäs 1999). This suggests a trend towards less regional differentiation among younger age groups. How far these smaller differences in employment rates will be manifest in less marked patterns of segregation is yet to become clear. Both generational and regional differences and their interactions have to be analysed further to understand changes in the processes of gender segregation and gender integration in the labour market.

6. Recommendations with respect to segregation indicators

- The problems of measuring segregation using indices lie primarily in the use of a single measure for a complex process. It is therefore recommended that current indices are retained but the trends are interpreted through use of decomposition techniques and with attention to their shortcomings, particularly for comparisons between different societies.
- The indices should be interpreted as indicators of change over a relatively long time period, and should not be used as indicators of short-term trends in gender equality.
- New and appropriate tools for indicating vertical segregation need to be developed.

- The structure of the labour market, numbers of hours worked and type of working contract all contribute to the explanations of the degree of gender segregation. Segregation indices should be calculated including and excluding part-time workers.
- Attention should be paid to the adequacy of the occupational classification systems.
- There needs to be more awareness that segregation levels are being compared across very different entities, as the scale of women's employment differs between countries, as well as the structure of the labour markets
- Analyses by age and educational level are needed to identify potential future trends.
- Segregation indices need to be combined with other types of indicators. An analysis of flows in the gender composition of occupations, for example between totally male dominated, medium male dominated, mixed, medium female dominated and totally female dominated occupations, could provide a useful complementary measure.

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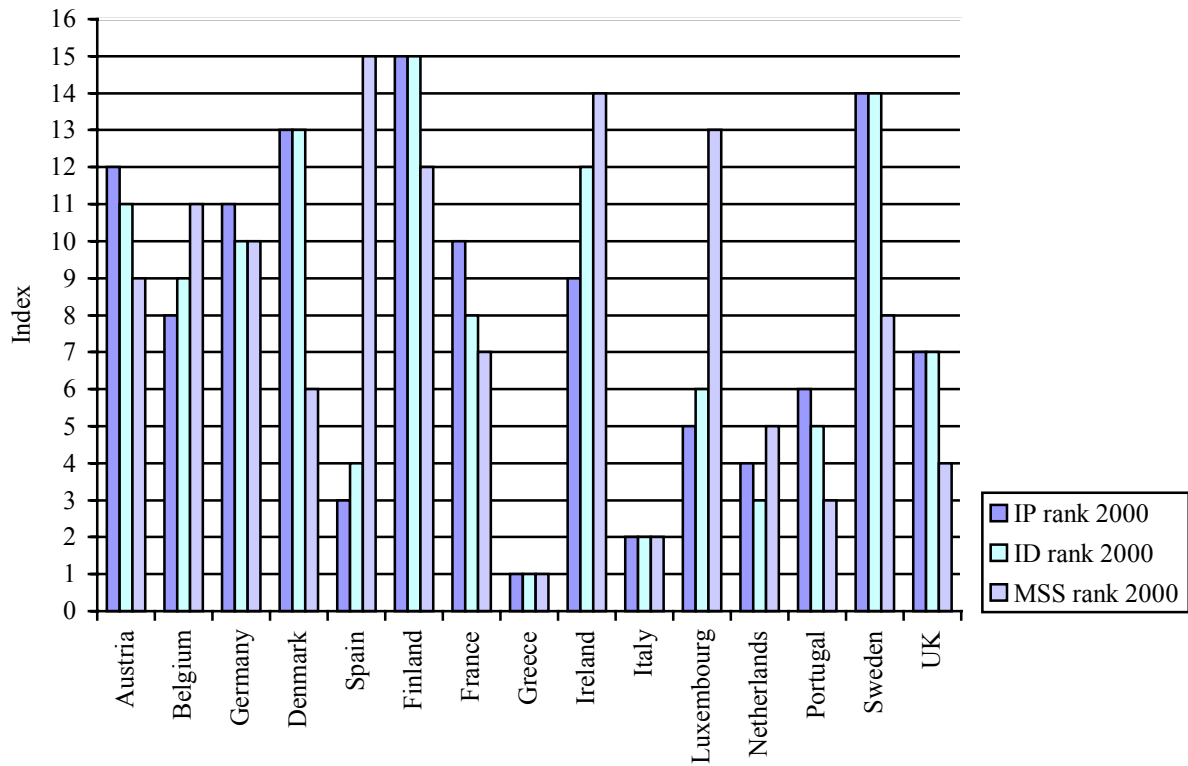
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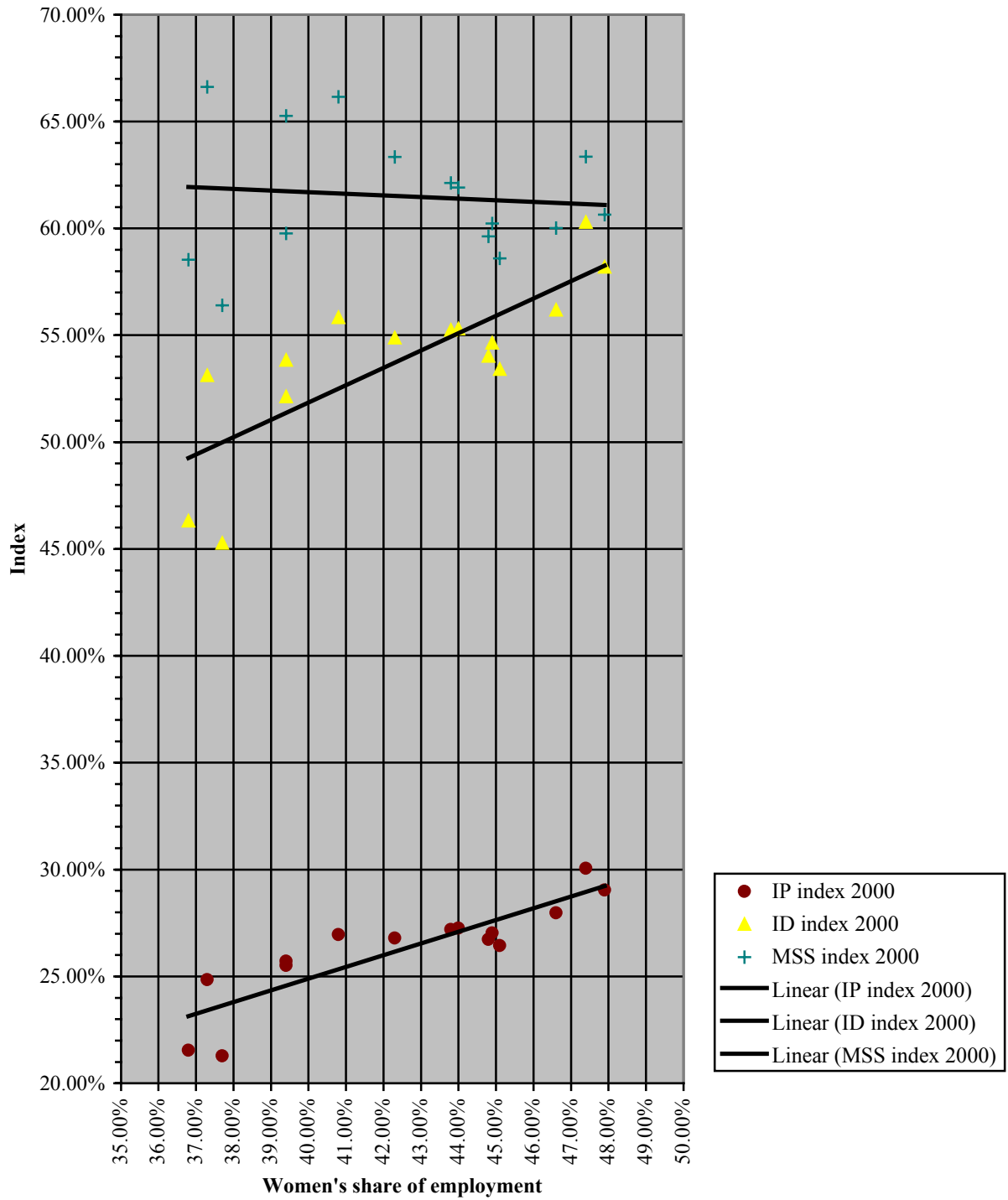
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Appendix Figure 1: Comparisons of country rankings by segregation index



Appendix figure 2. Relationships between indices of segregation and women's employment rate



Appendix Table 1. Index of Gender Segregation for All in Employment excluding Agricultural occupations

a. IP Index and Ranks

IP	2000		1999		1998		1997		1995	
Austria	28.54%	12	28.92%	12	28.79%	11	29.09%	13	25.00%	5
Belgium	26.89%	8	26.37%	6	26.17%	5	27.02%	8	25.83%	7
Germany	27.53%	9	27.69%	10	27.71%	9	27.44%	9	26.97%	10
Denmark	28.14%	11	29.46%	13	29.09%	12	27.97%	11	30.76%	13
Spain	25.70%	3	25.55%	4	25.31%	3	25.12%	4	24.82%	4
Finland	30.98%	15	29.92%	15	32.11%	14	31.03%	15	:	:
France	27.56%	10	27.62%	9	27.92%	10	28.13%	12	27.96%	12
Greece	24.14%	2	23.82%	2	24.25%	2	24.14%	2	23.71%	2
Ireland	26.88%	7	26.45%	7	:	:	24.82%	3	24.69%	3
Italy	22.30%	1	22.66%	1	22.31%	1	22.24%	1	22.27%	1
Luxembourg	25.88%	5	25.68%	5	26.28%	6	25.26%	5	26.49%	8
Netherlands	25.79%	4	25.03%	3	25.44%	4	25.92%	6	25.50%	6
Portugal	28.55%	13	28.13%	11	27.66%	8	26.82%	7	26.60%	9
Sweden	29.16%	14	29.52%	14	29.23%	13	29.94%	14	:	:
UK	26.75%	6	27.03%	8	27.28%	7	27.45%	10	27.71%	11
EU	25.88%		26.08%		26.05%		25.91%		25.52%	

b. ID index and Ranks

ID	2000		1999		1998		1997		1995	
Austria	57.95%	13	58.79%	12	58.58%	12	59.27%	13	50.98%	3
Belgium	54.95%	8	53.97%	6	53.90%	4	55.87%	9	53.67%	6
Germany	55.89%	10	56.27%	10	56.47%	10	55.98%	10	55.27%	9
Denmark	56.43%	11	59.15%	14	58.43%	11	56.23%	11	62.04%	13
Spain	54.55%	6	54.81%	8	54.78%	5	54.53%	7	54.44%	8
Finland	62.03%	15	59.91%	15	64.28%	14	62.13%	15	:	:
France	55.54%	9	55.68%	9	56.29%	9	56.78%	12	56.48%	11
Greece	51.93%	2	51.44%	3	52.81%	3	52.91%	3	52.56%	4
Ireland	54.79%	7	53.93%	5	:	:	50.86%	2	50.92%	2
Italy	47.78%	1	49.01%	1	48.56%	1	48.27%	1	48.72%	1
Luxembourg	53.91%	4	53.77%	4	55.72%	7	53.64%	5	57.62%	12
Netherlands	52.63%	3	51.19%	2	52.28%	2	53.44%	4	52.80%	5
Portugal	57.87%	12	57.04%	11	56.25%	8	54.43%	6	53.99%	7
Sweden	58.38%	14	59.11%	13	58.58%	13	59.95%	14	:	:
UK	54.00%	5	54.57%	7	55.09%	6	55.39%	8	55.96%	10
EU	52.80%		53.30%		53.35%		53.10%		52.55%	

c. WE Index and Ranks

WE	2000		1999		1998		1997		1995	
Austria	65.06%	13	66.30%	14	66.19%	10	67.33%	13	58.04%	1
Belgium	62.96%	9	62.15%	7	63.09%	7	65.95%	11	64.04%	9
Germany	62.69%	8	63.36%	10	64.16%	9	63.84%	9	63.87%	8
Denmark	59.39%	2	62.84%	9	62.23%	5	60.28%	2	67.72%	10
Spain	67.63%	15	69.06%	15	69.86%	14	69.84%	15	70.59%	12
Finland	64.13%	10	61.85%	6	66.31%	11	64.10%	10	:	:
France	60.38%	6	60.65%	3	61.37%	4	62.14%	7	62.04%	5
Greece	65.71%	14	65.43%	13	67.90%	12	68.56%	14	69.01%	11
Ireland	62.32%	7	61.38%	5	:	:	58.70%	1	59.78%	2
Italy	60.09%	4	62.44%	8	62.39%	6	61.80%	6	62.98%	7
Luxembourg	64.71%	12	65.15%	12	68.96%	13	66.56%	12	73.96%	13
Netherlands	60.10%	5	58.82%	1	60.84%	2	62.66%	8	62.55%	6
Portugal	64.56%	11	63.74%	11	63.46%	8	61.03%	4	60.52%	3
Sweden	60.01%	3	61.10%	4	61.18%	3	61.79%	5	:	:
UK	59.16%	1	59.81%	2	60.43%	1	60.64%	3	61.40%	4
EU	60.20%		61.07%		61.54%		61.31%		61.45%	

Note: Agricultural Occupations defined as ISCO 6 and ISCO 921

Source: ELFS 2000; 1998 -No data for Ireland; 1995 - No data for Sweden and Finland