

# Occupational segregation and female labour force participation in Southern Europe

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## Abstract

Occupational segregation has been pointed out as an important factor limiting female labour force participation. In this paper the occupational distribution and patterns of female employment in Southern European countries are investigated, and their contribution to cross-country differences assessed. Using a sample of married women, participation equations were estimated using information on actual and desired hours of work provided by the European Community Household Panel and a measure of occupational segregation in the set of regressors. Initial results, assign no role to occupational segregation in accounting for a higher female labour force participation in Portugal. However, when Oaxaca decompositions are computed and the contribution of each investigated, interpreting the second term as an indicator of the sensitivity of the labour market, leaves a role to national labour markets and potentially labour demand in explaining cross-country differences.

**Keywords:** occupational segregation; labor force participation; Oaxaca decomposition

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# 1 Introduction

Traditionally Southern European countries show low female labour force participation rates. The fact that Portugal strikes out as an exception has led to the investigation of the causes behind such phenomenon. So far, the attention has been concentrated in explaining the observed differences in female participation rates, through an analysis of the main determinants of female labour supply found in the literature. Although this chapter is also concerned with finding potential causes that may contribute to explain the Portuguese case, its analysis goes beyond the determinants of female labour supply to the extent that it provides some insight about the demand side of Southern European labour markets. Previous research on these countries suggests that the composition of the labour force differs across countries (Dolado *et al* 2002), employers or establishments (Cabral *et al*, 2003; Pfeffer and Davis-Black, 1987) and occupations (Dolado *et al* 2002).

The interest in segregation in the labour market has grown in the economic literature mainly due to its effect on male-female wage inequality<sup>1</sup>, which has led researchers to treat the determinants of segregation by sex, as determinants of male-female wage inequality. Although restrictive, since male-female wage inequality may have several other determinants besides occupational segregation, the development of this argument has allowed to assert the importance of labour force composition on the probability of a higher participation of women and its effect on wages and the wage gap. Traditionally introduced in the form of an index with a gender dimension (Duncan and Duncan, 1955), nowadays it is possible to estimate multi-dimensional segregation indices which allow, additionally to the gender dimension, to take into account other characteristics (e.g. marital status)(Flückiger and Silber, 1989). Another line of development relies on the importance of better understanding the information provided by the index given by a single number. The literature is rich of efforts to decompose segregation indices in order to distinguish between different effects (e.g. composition and mixture effects (Blau and Hendricks, 1979; Beller, 1985; Dolado *et al*, 2002) and, more recently random and systematic (Cabral *et al* 2003)). Finally the scope of the use of segregation indices, either based on a gender dimension or a multi categorical dimension, has widened accommodating occupational structures, establishments, industries (Carrington and Troske, 1994, 1997 and 1998 ) or countries (Melkas and Anker, 1997).

Based on a set of theoretical explanations for occupational segregation in the

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<sup>1</sup>Examples: Groshen, 1990; Macpherson and Hirsh, 1995; Miller, 1997

background, this chapter focus on occupational segregation to the extent it influences female labour force participation in Portugal and in the other Southern European countries. Occupational segregation indices will be computed and decomposed in order to help answering questions such as: what has been driven the occupational segregation pattern in Southern Europe? Does occupational segregation affects female labour force participation? What are the relations between higher employment rates and occupational segregation? The remainder of the chapter is organized as follows: section 2 briefly reviews the theoretical explanations for the observation and persistence of occupational segregation in the labour markets. Section 3 presents the data and computations of occupational segregation indices over time and across Southern European countries. Section 4 focus on how occupational segregation may affect labour market outcomes in terms of participation. Finally, section 5 concludes.

## **2 Why is there occupational segregation?**

Theoretically there are several explanations for the existence and persistence of occupational segregation across the globe. More or less formalized such theories rely on supply and demand factors that building on gender traditional roles assign women and men to particular occupations. On one hand, occupations may have different characteristics concerning initial requirements (amount and type of education, working experience, human capital) and career progressions (working hours, on-job training and updating, tenure and interruption penalties) leading to differences in wages and income. On the other hand, there may be gender differences in occupational distributions, with males dominating in higher paid and prestige occupations and females concentrated in lower paid occupations or, finally, there may be gender discrimination in the labour market and in the society as a whole. Different authors have given different levels of importance to the possible determinants of occupational segregation, leading to alternative and sometimes complementary approaches of the determinants of occupational segregation. In the literature, these have been broadly divided into (see, for example, Anker, 1997, Anker 1998 or Lewis and Shorten, 1991): the human capital model; institutional, segmented labour markets and discrimination, and gender based theories.

## 2.1 The human capital model

Within the neoclassical theory framework the human capital model, has been initially applied to the study of occupational segregation by Polachek (Polachek, 1981). Basically, it assumes that workers and employers are rational and that labour markets function efficiently. Workers will search for the best paying jobs, considering their own personal endowments (for example, education and experience), constraints (for example, the need to look after young children or the elderly) and preferences (which will take into account the possibility of flexible hours or the choice of occupations which are relatively easy to interrupt without significant penalties). According to the model, investing in human capital will enhance productivity and lead to an improvement in earnings. Employers seek to maximize their profits which, in other words, means maximize productivity and minimize costs. In a context of competition and efficiency in the labour market, employers will pay workers their marginal product which is reflected in different opportunities of promotion and career development within firms. The implications of the human capital model are to be found both on the demand and supply side of the labour market. On the supply side, it results that women are bound to receive a lower payment, compared to men, because they show lower levels of human capital both in terms of education and experience, reflecting the effect of family related factors such as marriage and motherhood and their almost exclusively responsibility for the housework. Given these factors, and according to the human capital approach, women will rationally choose occupations with a relatively high starting pay, relatively low returns to experience and relatively low penalties for career interruptions. Beyond the neoclassical theory and in a more dynamic approach, it has been argued that women are constrained by their own personal endowments in the choice of an occupation, being these personal endowments, in some cases, already a result of parents' decision to invest more in the education of their sons, providing them more and better job market opportunities (Anker, 1998). Also Altonji and Blank (1999, p. 3176) have suggested, differences in pre labour market human capital investment and non labour market activities may lead to differences in comparative advantage across occupations. The evolution of female labour market participation, however, poses some problems to the neoclassical theory. Female labour force participation and experience in the labour market has been increasing, while household work due to the increasing age of marriage and the decreasing fertility rates is decreasing. Nevertheless, this has not implied major changes in the types of occupations women prefer and are offered, and occu-

occupational segregation has, generally, remained persistently high (Anker, 1998). On the demand side, on one hand the process of hiring labour implies search and selection costs and on the other, the tends to invest in on-job training to enhance productivity. Both hiring and training are investments which return will depend upon the length of tenure of the employee. Given the higher rates of absenteeism, of arriving late at work, of quitting and career interruptions and job turnover associated with female participation in the labour market, the human capital model postulates that, *ceteris paribus* it is rational for employers to prefer male labour, unless women are willing to be paid less (Lewis and Shorten, 1991). However, it is important to question the assumptions that relate higher direct and indirect costs to female employees, particularly due to the lack of consistent empirical evidence (Anker, 1997).<sup>2</sup> The difficulty in fully accommodating the persistence in occupational segregation and earnings differentials within the human capital model, based on different characteristics of males and females, has led to the development of the neoclassical theory, keeping the assumptions of rationality and efficiency, into theories such as: the employers' taste for discrimination (based on the idea that given a certain prejudice towards particular groups in society, employers bear a desutility or cost when hiring workers from these particular discriminated groups) and the theory of compensating wage differentials (women prefer occupations with good working conditions and good fringe benefits, being the lower earnings associated with these occupations explained by these non-wage payments). Stressing the importance of systematic gender differences concerning initial and accumulated human capital, the human capital model suggests that reducing occupational segregation implies policies addressing non-labour market factors.<sup>3</sup>

## 2.2 Institutional, segmented labour markets and discrimination

Also inspired by neoclassical theory, the institutional theory assumes that institutions, such as workers unions, play an important role in determining labour demand and career patterns. Moreover, it assumes that the labour market is somehow segmented and that it is difficult for workers to move between segments. There is a

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<sup>2</sup>Anker (1997) also notes the importance of labour laws and regulations which prevent women from working in certain conditions and or occupations. Nevertheless, as it is also mentioned, these laws are nowadays under review. Other labour laws and regulations, such as paid maternity leave, while increasing the cost of female workers compared to male workers may turn out as a form of sex discrimination if employers have to bear this cost.

<sup>3</sup>The human capital model explanation for occupational segregation has been developed mainly by Polachek. Having previously approached the topic in a context of household division of work (Polachek, 1975), education choices (Polachek, 1978) and females' earnings (Mincer and Polachek, 1974 and 1978) Polachek proposes a model of occupational self selection to explain gender differences in occupational structures (Polachek, 1981). Since then it has been questioned and an interesting controversy has filled numerous pages of the economic literature (England, 1982; England 1985; Polachek, 1985a; Polachek 1985b) and tested (e.g. Duncan and Prus, 1992).

dual labour market with a primary sector relatively good in terms of pay, security, career opportunities and working conditions and secondary sector where pay, security and career opportunities are low and working conditions poor; and there is the perception that these sector function as independent labour markets. Occupational segregation reflects the fact that females tend to be stuck in the secondary sector while males tend to be found in the primary sector. Firms in the primary sector will hire more educated and experienced workers being willing to pay higher wages and such firms will, generally, tend to prefer male workers.

Altonji and Blank (1999) have identified three types of discrimination among the causes for occupational segregation: taste based discrimination; statistical discrimination and discrimination arising from collective choice. Becker (1971)<sup>4</sup> has proposed models of discrimination (employer; employee and customer) which identified prejudice as a taste for discrimination. In such context, employer discrimination arises in a situation in which some employers are prejudiced against the members of the minority group (as opposed to the majority group). Workers from the discriminated group will be employed by the least prejudiced firms and segregation in the labour market will arise given the existence of these two distinct groups of workers. One major drawback of Becker's competitive models was the fact that, in the long run, the wage gap between the two groups would be eliminated leading to a result inconsistent with the real world (particularly with the North American reality concerning black and white workers). The persistence of wage gaps would be later accommodated through the introduction of search costs in the employer discrimination model.

The statistical discrimination theory is based on the assumption that there are differences on average in job related characteristics and performances of different groups of workers, such as men and women. Furthermore, it assumes that hiring and promoting workers have associated high search and information costs. Therefore, it is rational for employer to discriminate against the group showing lower abilities on average when the cost associated with such discriminatory behaviour is lower than the cost of fully identify the individuals' abilities and base promotion decisions on these.

Finally, collective action may lead or enforce labour market discrimination. Situations in which members of different groups select themselves into different occupations due to differences concerning the social norms regarding appropriate oc-

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<sup>4</sup>Becker, G. S. (1971), *The economics of discrimination*, 2nd ed, The University of Chicago Press, Chicago, IL, cited in Altonji and Blank (1999).

occupations or due to legal and institutional constraints are examples of potential outcomes of collective action (Altonji and Blank, 1999).

Although providing an important contribution to understanding the observed gender inequality in occupational distribution, based on the assumptions that the labour market is segmented or that there is discrimination in the labour market, these theories *per se* fail to provide an explanation for the gender occupational segregation, its causes and its persistence.

### **2.3 Gender based theories**

Gender based theories exploit a set of factors that may contribute to occupational segregation and that have been ignored by economists either due to the impossibility to tackle them within an economic theory framework or simply due to a lack of interest. These theories provide explanations based on non-labour market variables which are generally considered exogenous by economists. The basic assumption is that society and women's subordinate position within the family have led to a female position of disadvantage in the labour market. The main contribution of these theories is the correspondence between female occupations characteristics and common stereotypes of women and their abilities which have been considered to play an important role in occupational segregation in a series of enterprize surveys in transition and developing countries (Anker, 1997).

## **3 Female employment and occupational segregation in Portugal and in Southern Europe**

In order to analyze female employment in Southern Europe and to address the question of whether occupational segregation plays a role in explaining differences in participation rates across Southern European countries, it is important to investigate the occupational distribution of female activity and how it has changed through time, assuming that information on females' characteristics and the type of occupations in which women tend to be found may help understanding cross country differences. In this section, occupational structures for female employment in Southern European countries are identified and differences between Portugal and the other countries are highlighted. Moreover, changes in occupational segregation may arise from different sources. If differences in occupational segregation do play a role in explaining differences in female labour force participation, then identifying the source of occupational segregation becomes a crucial task. For each country,



segregation indices are computed for the each year as well as their change over the period and the contribution of different sources asserted. Finally, differences in occupational segregation between Portugal and the other countries are computed and its sources investigated.

### **3.1 Occupational structure of female employment in Southern Europe**

Based on the European Community Household Panel, and following a similar procedure found in Dolado *et al* (2002), differences in the occupational structure of married women fulltime employment were computed, using 9 occupational categories for the two years. For each country, the proportion of female employment over all employment per occupation and in total was initially computed and differences between Portugal and the other Southern European countries reported (table 1 and table 2). In both years, *Professional, Skilled agricultural and fishery workers* and *Elementary occupations* were the categories where higher discrepancies were observed. In the first occupational category, Portugal shows a lower proportion of women (perhaps a reflection of a lower average education), in the second occupational category, a higher proportion of women compared to Spain and Italy and a lower compared to Greece (denoting the importance the primary sector still plays in the employment structures of these two countries) and, finally, in the third category, there is a greater proportion of women when compared to Greece and Italy (again, a possible explanation may be the lower average education of Portuguese women).

Defining occupations has being "female" when the proportion of women in that occupation is greater that the proportion of women in overall employment by more than five percentage points; "integrated" when the proportion of women in that occupation is within five percentage points above and five percentage points below their share in total employment; and considering the remainder "male" occupations (based on Beller, 1982 and 1985), female the distribution of female employment by occupational category (female; integrated; male) was computed (table 3). "Female" occupations absorb more than fifty percent of female employment and this percentage has been increasing, anticipating an increase in occupational segregation in Southern European countries during this period. The pattern of occupations type, by their weight in female employment, "female-integrated-male", is present in both period in the cases of Spain and Italy and in the latest period in the case of Greece. Two possible effects may be at work: an increase in female employment in specific occupations or an increase of the number of occupations which became more gen-

Table 1: Occupational structure of female employment: Differences between Portugal and other Southern European countries

	Spain	Italy	Greece
Legislators, senior officials and managers	-4.44	4.64	-4.48
Professionals	-12.09	-13.07	-8.37
Technicians	-1.35	-2.28	3.14
Clerks	0.27	-14.55	-2.13
Services, shop and market sales workers	1.49	4.38	8.02
Skilled agricultural and fishery workers	8.40	10.13	-10.40
Craft workers	5.20	1.33	2.14
Plant and machine assemblers	1.24	0.78	2.19
Elementary occupations	1.26	8.65	9.89
Employment	24.79	17.35	16.39

**Source:** Computations based on the European Community Household Panel, 1997 (9 occupations)

Table 2: Occupational structure of female employment: Differences between Portugal and other Southern European countries

	Spain	Italy	Greece
Legislators, senior officials and managers	-0.89	3.73	-4.22
Professionals	-10.30	-12.92	-5.62
Technicians	-2.59	-0.27	3.63
Clerks	1.51	-14.86	-3.19
Services, shop and market sales workers	-3.85	1.17	2.86
Skilled agricultural and fishery workers	6.05	6.71	-9.77
Craft workers	4.77	2.80	4.45
Plant and machine assemblers	1.62	1.88	2.50
Elementary occupations	3.69	11.75	9.35
Employment	22.87	21.66	18.08

**Source:** Computations based on the European Community Household Panel, 2001 (9 occupations)

der balanced. Portugal, strikes out has the only country where the above pattern is never observed. Females tend to be employed, mainly in "female" occupations, followed by "male" occupations, which anticipates a potentially more segregated labour market.

Table 3: Distribution of female full time workers by occupational category

	Portugal	Spain	Italy	Greece
<b>1997</b>				
Female	52.97	57.95	53.40	52.16
Integrated	14.23	25.91	14.93	14.50
Male	19.59	7.41	12.84	19.74
<b>2001</b>				
Female	68.8	68.09	65.63	68.88
Integrated	11.08	17.28	22.67	23.62
Male	20.12	14.62	11.71	7.51

**Source:** Computations based on the European Community Household Panel, 1997 and 2001 (9 occupations)

### 3.2 Female employment and occupational segregation

In order to measure occupational segregation Dissimilarity Indices were computed according to the following expression:

$$D_t = \sum_{i=1}^T \frac{1}{2} |f_{it} - m_{it}| \tag{1}$$

where  $m_{it}$  is the percentage of male labour force employed in occupation  $i$  in year  $t$ ; and  $f_{it}$  is the percentage of female labour force employed in occupation  $i$  in year  $t$ . The dissimilarity index may take a value between 0 and 1. If it takes value 0 it indicates that the distribution of women across occupations is identical to that of men. The proportion of women in each occupation is roughly identical to the proportion of women in the total labour force. If it take value 1, then there is complete segregation, meaning women are concentrated in certain occupations and men in entirely male occupations. According to Blau and Hendriks (Blau and Hendriks, 1979, p.199), observed changes through time in the index may result from two sources: changes in the sex composition of particular occupational categories or, alternatively, changes in the occupational structure of the economy. Rewriting the dissimilarity or segregation index allows the observed changes to be decomposed into those two sources: changes due to shifts in sex composition within occupations and changes due to shifts in the occupation mix of the economy. In this paper, Blau and Hendriks decomposition is used not only to better understand the sources of changes throughout time in Portugal and in the other Southern European countries,

but also to better understand the sources of the observed differences in the indices across Southern European countries. Equation (1), can be rewritten as:

$$S_t = \sum_{i=1}^T \frac{1}{2} \left| \frac{q_{it}T_{it}}{\sum_i q_{it}T_{it}} - \frac{p_{it}T_{it}}{\sum_i p_{it}T_{it}} \right| \quad (2)$$

where  $T_{it} = F_{it} + M_{it}$  is the total employment in occupation  $i$ , in year or country  $t$ , being  $F_{it}$  the number of females in occupation  $i$  in year or in country  $t$  and  $M_{it}$  the number of males in occupation  $i$  in year or in country  $t$ , depending on the perspective (time or cross-country).  $p_{it}$  and  $q_{it}$  are, respectively the ratios  $F_{it}/T_{it}$  and  $M_{it}/T_{it}$ .

Based on equation (2), the effects of the occupation mix and the occupation composition on the change in the segregation index between two years or on the difference in the segregation index between two countries can be computed, using the following:

$$MIX = \frac{1}{2} \left[ \sum_{i=1}^T \left| \frac{q_{i2}T_{i2}}{\sum_i q_{i2}T_{i2}} - \frac{p_{i2}T_{i2}}{\sum_i p_{i2}T_{i2}} \right| - \sum_{i=1}^T \left| \frac{q_{i1}T_{i1}}{\sum_i q_{i1}T_{i1}} - \frac{p_{i1}T_{i1}}{\sum_i p_{i1}T_{i1}} \right| \right] \quad (3)$$

$$COMP = \frac{1}{2} \left[ \sum_{i=1}^T \left| \frac{q_{i2}T_{i1}}{\sum_i q_{i2}T_{i1}} - \frac{p_{i2}T_{i1}}{\sum_i p_{i2}T_{i1}} \right| - \sum_{i=1}^T \left| \frac{q_{i1}T_{i1}}{\sum_i q_{i1}T_{i1}} - \frac{p_{i1}T_{i1}}{\sum_i p_{i1}T_{i1}} \right| \right] \quad (4)$$

According to the previous equations, the mix effect captures the changes in the segregation index the would have occurred if the sex composition within each occupation were constant throughout time or across countries implying that the only source of differences between two years or two countries would be due to changes or differences in the size of occupational categories; whereas the composition effect captures the changes in the index that would have occurred if the size of each occupational category were fixed implying that the only source of differences in the indices between two year or two countries would be due to changes or differences in the sex composition within occupations. When a consistent set of weights is used for both the mix and composition effects the two will not necessarily add up to the total difference in the index between two periods or two countries. The remaining residual may be interpreted as due to an interaction of the two previous effects.

### 3.3 Occupational segregation in Portugal

Previous studies on segregation in Portugal, based on the establishment, have found that gender segregation in the labour market is high and has remained quite stable

between 1985 and 1999. Moreover, a slight increase in segregation was observed, over that period, which was accounted for by the change in the dimension of the establishments and by the increase in the female participation in the labour market (Cabral *et al*, 2003, p. 5). In this paper, the focus is on occupational segregation so dissimilarity indices were computed based on occupational categories. Using the European Community Household Panel,<sup>5</sup> the focus was placed on married women, since differences in labour force participation across Southern European countries are mainly concerning married women. Table 4 summarizes the calculations.

Table 4: Occupational Segregation in Portugal - Mix and Composition effects

	Occupational Seg. Index	Actual change	Mix effects	Composition effects	Interaction effects
9 occupations					
1997	0.2958				
2001	0.3258	0.0300	0.0009	0.0293	-0.0002
18 occupations					
1997	0.3521				
2001	0.3883	0.0362	0.015	0.0216	-0.0004

**Source:** Computations based on the European Community Household Panel, 1997 and 2001.

According to the results obtained, occupational segregation has increased over the period analyzed, due to changes both in the size of occupational categories and in the sex composition within occupations. As expected, the more disaggregated the occupational categories the greater the index. Although the number of occupational categories does not seem to affect substantially the absolute change in the segregation index, the sources of that change, i.e., the contribution of mix and composition effects is affected as composition effects seem to loose explanatory power to mix effects with the increase in the number of occupational categories. This result is not surprising given that in the presence of a higher number of occupational categories, the probability of occurring changes within each category is naturally smaller. Nevertheless, the decomposition for the change in the occupational segregation index computed for Portugal between 1997 and 2001 show that with more disaggregated occupational categories (18 occupations) the change in size of the occupational category accounts for around 2/5 of the change in the index whereas the change in the composition within the occupational category accounts for 3/5.

<sup>5</sup>See table 1 for the list of 9 occupations and the appendices for the list of 18 occupations.

### 3.4 Occupational segregation in Southern Europe

Occupational segregation indices were computed, based on the European Community Household Panel, for four countries, for two year covering a period of five years. Table 5 summarizes the results and table 6 presents decompositions of the actual changes in the occupational segregation, during the period analyzed, into mix and composition effects. Although, according to the results, the correlation between

Table 5: Female Employment and Occupational Segregation in Southern Europe

	Portugal	Spain	Italy	Greece
Female Employment - 1997	0.5295	0.3238	0.3761	0.3859
Female Employment - 2001	0.5808	0.4181	0.3952	0.4243
Actual change	0.0513	0.0943	0.0191	0.0384
Change (%)	0.0969	0.2912	0.0508	0.0995
Occupational segregation index - 1997	0.3521	0.4041	0.3503	0.2963
Occupational segregation index - 2001	0.3883	0.4350	0.3519	0.3175
Actual change	0.0362	0.0309	0.0016	0.0212
Change (%)	0.1028	0.0765	0.0046	0.0715

**Source:** Computations based on the European Community Household Panel, 1997 and 2001 (18 occupational categories).

Table 6: Time Changes in Occupational Segregation in Southern Europe - Mix and Composition effects for each country

	Portugal	Spain	Italy	Greece
<b>Actual change</b>	0.0362	0.0309	0.0016	0.0212
<b>Mix effects</b>	0.0150	-0.0065	-0.0046	0.0007
Contribution to the Actual change (%)	0.4144	-0.2104	-2.8750	0.0330
<b>Composition effects</b>	0.0216	0.0381	0.0080	0.0219
Contribution to the Actual change (%)	0.5967	1.2330	5.0000	1.0330
<b>Interaction effects</b>	-0.0004	-0.0007	-0.0018	-0.0014
Contribution to the Actual change (%)	-0.0110	-0.0227	-1.1250	-0.0660

**Source:** Computations based on the European Community Household Panel, 1997 and 2001 (18 occupational categories).

female employment and occupational segregation does not seem to be clear, in general, higher changes in female employment are associated with higher changes in the index. The case of Spain, where given the outstanding increase in female employment, one would expect a higher increase in occupational segregation, may be due to the lower initial values of female employment. In Portugal, on the other hand, where female employment is high and the increase in female employment was also quite high, occupational segregation has shown the highest absolute and relative increase. In Italy, on the contrary, the increase in female employment was low and so was the increase in the occupational segregation index. When changes in occupational segregation are decomposed into mix and composition effects, mix effects are less important or even negative in their contribution to the increase in occupational segregation, meaning that changes in the size of occupational categories were not as determinant as the changes in their composition, i.e., composition effects. In fact, composition effects play a major role in accounting for the general increase in occupational segregation in Southern Europe during these five years. Both in Spain and Italy, if only mix effects were observed, occupational segregation would have actually declined. In this paper, however, the interest is not only concerning changes through time in occupational segregation in Southern Europe and which source of change plays the most important role, but also concerning the different realities across the four countries and whether mix or composition (or both) effects are the key factor accounting for observed cross country differences. In order to capture this aspects of occupational segregation in Southern Europe, equations (3) and (4) were used, with  $t$  representing a country. Fixing the values for Portugal, where female employment is high and contributions of occupational segregation to this difference are to be asserted in this paper, mix and composition effects were computed in order to understand whether differences in occupational segregation indices in Southern Europe, or, more specifically, between Portugal and the other Southern European countries were due to differences in the size of occupational categories or in the composition of these categories. Table 7 reports the main results. When comparing occupational segregation indices across Southern European countries, Portuguese labour market is less segregated than the Spanish, even though, differences in segregation indices have decreased. Both Italian and Greek labour markets are slightly less segregated than the Portuguese labour market but differences in segregation indices have increased. However, the source of the observed differences is not the same across countries and has changed through the period. While in Greece lower occupational segregation is driven by mix effects, in Italy

Table 7: Differences in Occupational Segregation across Southern European countries - Mix and Composition effects

	Spain-Portugal	Italy-Portugal	Greece-Portugal
<b>Difference - 1997</b>	0.0520	-0.0018	-0.0558
<b>Mix effects</b>	0.0314	0.0152	-0.0484
Contribution to the difference (%)	0.6038	-8.4444	0.8674
<b>Composition effects</b>	0.0601	-0.0068	-0.0414
Contribution to the difference (%)	1.1558	3.7778	0.7419
<b>Interaction effects</b>	-0.0395	-0.0102	0.0340
Contribution to the difference (%)	-0.7596	5.6667	-0.6093
<b>Difference - 2001</b>	0.0467	-0.0364	-0.0708
<b>Mix effects</b>	-0.0074	-0.0120	-0.0489
Contribution to the difference (%)	-0.1585	0.3297	0.6907
<b>Composition effects</b>	0.0744	-0.0404	-0.0275
Contribution to the difference (%)	1.5931	1.1099	0.3884
<b>Interaction effects</b>	-0.0203	0.0160	0.0056
Contribution to the difference (%)	-0.4347	-0.4396	-0.0791

**Source:** Computations based on the European Community Household Panel, 1997 and 2001 (18 occupational categories).

composition effect (associated with interaction effects) play the main role. While in Greece, this fact has become more clear through time, in Italy mix and composition factors tended to produce similar effects. In Spain, higher occupational segregation has been due mainly to composition effects and this has become clearer throughout the period, with mix factors actually contributing to the observed decrease in the difference.

From this section, two main conclusions may be drawn: firstly, the potential importance of the lower average education and of the primary sector in explaining Portuguese female occupational structures; secondly, the importance of composition effects in accounting for higher occupational segregation indices through time and across countries.



## 4 Occupational segregation and female labour market participation decisions

### 4.1 The empirical model

Based on the simplest version of the neo-classical model of labour supply, empirically the hours of work can be determined according to an equation like:

$$L_{ijt} = \beta_{jt}X_{ijt} + \epsilon_{ijt} \quad (5)$$

where the subscript  $i$  indicates the individual,  $j$  the country (Portugal, Spain, Italy or Greece) and  $t$  the year (1997 or 2001).  $L$  denotes female labour force participation measured in hours per week,  $X$  a set of individual and job related characteristics, here also including a measure of occupational segregation in the country,  $\beta$  the regression coefficients and  $\epsilon$  a random component, satisfying the usual assumptions.<sup>6</sup> Anker (1998), uses the proportion of females in each occupation as a measure of occupational segregation. Usually, estimating such type of equations has associated selection problems which arise from the fact that the desired hours of work for those unemployed or not participating in the labour market are not observed. Taking into account that female employment rates are lower than male's and particularly low in Southern European countries, this problem gains greater importance. One way of overcoming this problem is to use the Heckman procedure (Heckman, 1979), however, a closer inspection of the information provided by the database in use, provides the information needed on desired hours, since individuals were asked and have provided an answer to the following question:

*"Assuming you could find suitable work, how many hours per week would you prefer to work in this new job?"*

For those employed, actual working hours were used, assuming that each individual works the amount of hours she desires<sup>7</sup> and for those unemployed or not participating in the labour market their preferred hours were considered.<sup>8</sup>

### 4.2 How important is occupational segregation?

To evaluate the impact of occupational segregation on female labour market participation in Southern Europe, the focus was placed on married women. In fact,

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<sup>6</sup>the distribution of  $\epsilon_{ijt}$  conditional on the  $X$ s is normal with mean zero and variance  $\sigma^2$  and  $\epsilon_{ijt}$  is independent across individuals in the sample

<sup>7</sup>Although potentially questionable, the procedure adopted while implementing the ECHP questionnaires leads to this conclusion, since no information on desired hours is available for those women who have reported positive working hours.

<sup>8</sup>Desired hours are available for women without a job but looking for one. For those without a job and not looking for one, zero desired hours of work were considered.

when a sub sample of single women is considered, female labour force participation in Southern Europe is quite similar across countries. Tables 12 and 13 in the appendices present descriptive statistics. Based on these samples of married women, equation (5) was estimated for each Southern European country in two different periods (1997 and 2001). Alternative measures of occupational segregation based on indices were considered. Cabral *et al* (2003), Gerhart and Cheikh, (1991) and Pfeffer and Davis-Black (1987), have considered the proportion of women in each occupation. However, while the proportion of females in each occupation may be indicative of the occupational segregation present in a particular country, it is likely to be affected by female participation in the labour market leading to biased estimates when using such variable to explain female labour market participation; moreover, there may be common factors explaining both occupational segregation and female labour force participation, namely the fact that women may prefer to work in occupations with particular characteristics as argued in the framework of the human capital model, presented in section 2.1. In order to overcome these potential problems, occupational segregation indices were computed based on pre-defined categories using the sub sample of employed women and employed men and then imputed to unemployed or non-participant women in the same category. In building these categories, two alternative definitions were employed: one based on region; and another based on a combination of region and education level. Tables 8 and 9 summarize the results for 1997 and 2001, concerning the coefficients of interest, respectively.<sup>9</sup>

Table 8: Segregation and participation (OLS estimates) - 1997

	Portugal (1)	Spain (2)	Italy (3)	Greece (4)
Index (region)	-11.68 (3.01)***	-2.29 (5.07)	5.98 (3.75)	-2.84 (3.28)
Index (region-education level)	-8.3 (2.42)***	-6.81 (4.06)*	.97 (1.52)	-5.21 (2.39)**
Obs.	2787	3455	4160	2874

**Source:** Computations based on the European Community Household Panel, 1997 (9 occupational categories).

From OLS results it is possible to assert the importance of occupational segregation on female labour force participation, measured in hours. In general, the effect of occupational segregation on the desired hours of work is negative,<sup>10</sup> as predicted

<sup>9</sup>Complete tables are reported in the appendices.

<sup>10</sup>When statistically significant with Italy being the only exception, showing positive, statistically significant estimates for 2001.

Table 9: Segregation and participation (OLS estimates) - 2001

	Portugal	Spain	Italy	Greece
	(1)	(2)	(3)	(4)
Index (region)	-9.05 (2.06)***	7.85 (5.55)	12.2 (4.13)***	3.29 (3.61)
Index (region-education level)	-6.43 (1.91)***	6.05 (4.58)	1.85 (1.95)	1.36 (2.69)
Obs.	2619	2707	3349	2313

**Source:** Computations based on the European Community Household Panel, 2001 (9 occupational categories).

within the framework of the human capital model, particularly in countries where female participation in the labour market has been traditionally higher. The results concerning Portugal are actually in agreement with the more descriptive sections of this paper. It seems then that occupational segregation while reflecting labour demand constraints is not playing a determinant role in accounting for the higher female labour force participation in Portugal.

In order to account for individual unobserved heterogeneity that might affect female preferences concerning labour force participation, a fixed-effects model<sup>11</sup> was estimated making use of the panel dimension of the data. In this context individual unobserved heterogeneity may arise from different family background that influence females' behaviour concerning labour supply decisions. For instance, it has been found in the literature that the fact that mothers and mother-in-law participate in the labour market has a positive effect on females' decisions to participate. The importance of this inter-generation transmission of labour market behaviours is present in Italy (Del Boca *et al*, 2000) and in Portugal (Torres, 2004, p. 47).

The empirical model in section 4.1 can be rewritten as:

$$L_{ijt} = \alpha_{ij} + \beta_{jt}X_{ijt} + \epsilon_{ijt} \quad (6)$$

recalling that the subscript  $i$  indicates the individual,  $j$  the country (Portugal, Spain, Italy or Greece) and  $t$  the year (1997 or 2001).  $L$  denotes female labour force participation measured in hours per week,  $X$  a set of individual and job related characteristics, here also including a measure of occupational segregation in the country,  $\beta$  the regression coefficients and  $\epsilon$  a random component, satisfying the usual assumptions. Finally,  $\alpha$  denotes the individual's unobserved effect which is believed to be correlated with other explanatory variables. Using fixed effects models implies assuming a different intercept for each individual and concentrating on differences

<sup>11</sup>See Verbeek, 2000, pp.309-315 or Wooldridge, 2003, pp. 441-9.

within individuals. The individual effects may be eliminated transforming the data. Averaging these through time yields:

$$\bar{L}_{ij} = \alpha_{ij} + \beta_j \bar{X}_{ij} + \bar{\epsilon}_{ij} \quad (7)$$

where  $\bar{L}_{ij} = T^{-1} \sum_t L_{ij,t}$  and similarly for the other variables. Consequently, it can be written as a regression model in deviations from individual means in which the unobserved individual effect  $\alpha_{ij}$ , as well as any other time constant variable, disappear:<sup>12</sup>

$$L_{ij,t} - \bar{L}_{ij} = \beta_j (X_{ij,t} - \bar{X}_{ij}) + (\epsilon_{ij,t} - \bar{\epsilon}_{ij}) \quad (8)$$

Table 10 summarizes the results.

Table 10: Segregation and participation (FE estimates)

	Portugal	Spain	Italy	Greece
	(1)	(2)	(3)	(4)
Index (region)	9.14 (11.25)	-.97 (4.81)	-2.36 (6.76)	-17.7 (17.64)
Index (region-education level)	6.73 (4.63)	.06 (4.23)	2.91 (2.07)	2.44 (5.54)
Obs.	5406	6162	7509	5187

**Source:** Computations based on the European Community Household Panel 1997 and 2001 (9 occupational categories).

According to the results obtained, occupational segregation does not seem to a role in explaining female labour force participation. Nevertheless, it should be noted that while  $X_{ij,t}$  frequently has substantial variation in the cross section for each  $t$ ,  $ij$  may not have much variation leading to large OLS standard errors (Wooldridge, 2003, p. 423). Were the estimates valid and strikingly enough occupational segregation has a positive and much higher influence on female labour force participation in Portugal than in the other Southern European countries, as if in Portugal there were certain occupations, for which there was labour demand but not enough male labour supply. Therefore, in those occupations females would tend to be employed. Moreover, the fact that occupational segregation is high and not declining, would favour the maintenance of female employment in female type occupations.

<sup>12</sup>Given that only two periods are being considered,  $T=2$ , the fixed-effects and first differencing estimates and all the test statistics are identical (Wooldridge, 2003, p.447).

### 4.3 Are Southern European females that different or is labour demand driving the result?

Following the literature on occupational segregation and wage inequality, the difference in participation was decomposed. Based on the Oaxaca (Oaxaca, 1973) gender decomposition <sup>13</sup> and on the estimation results from equation (5), it follows that:

$$(\bar{L}_{Pt} - \bar{L}_{jt}) = (\bar{X}_{Pt} - \bar{X}_{jt})\hat{\beta}_{Pt} - (\hat{\beta}_{Pt} - \hat{\beta}_{jt})\bar{X}_{jt} \quad (9)$$

where  $P$  accounts for Portugal and  $j = (S : Spain, I : Italy, G : Greece)$ . This decomposition allows to investigate the portion of the participation gap which may be attributable to the differences in the mean values of women's characteristics from different countries, i.e., differences in their endowments (first term on the right hand side); and the portion of the participation gap which may be attributable to how such characteristics translate themselves into hours of work, given some sensitivity of how demand influences labour market participation. Table 11 presents the results.

Table 11: Oaxaca Decompositions based on FE estimates

	Endowments	Market
<b>Portugal-Spain</b>		
Index (region)	6.626	1.176
Contribution to the difference	84.93%	15.07%
Index (region-education level)	6.594	1.209
Contribution to the difference	84.51%	15.49%
<b>Portugal-Italy</b>		
Index (region)	7.154	1.366
Contribution to the difference	83.97%	16.03%
Index (region-education level)	6.997	1.519
Contribution to the difference	82.16%	17.84%
<b>Portugal-Greece</b>		
Index (region)	5.810	1.457
Contribution to the difference	79.95%	20.05%
Index (region-education level)	5.523	1.744
Contribution to the difference	76.00%	24.00%

**Source:** Computations based on the European Community Household Panel.

Although from descriptive statistics, Southern European women seemed to be fairly similar, the decomposition shows that differences in the average characteristics of women from different countries, play a major role in accounting for the

<sup>13</sup>An alternative decomposition is developed in Cotton (1988) and Neumark (1988)

differences in hours worked (either actual or desired). The second term, originally interpreted as an indicator of discrimination, is here interpreted as an indicator of the sensitivity of the different labour markets. Although it is relatively less important, its contribution is positive, ranging from 15 to 20%. Therefore, contrary to the initial idea that labour demand was not an issue when accounting for higher female labour force participation in Portugal compared to other Southern European countries, interpreting the second term of the Oaxaca decomposition as labour market constraints, including labour demand constraints, assigns a potential role to labour demand.

## 5 Discussion

Occupational segregation has been considered throughout the literature as a phenomenon which jeopardizes female labour force participation both in quantity and in quality. In this particular analysis, the interest was mainly on the extent occupational segregation in particular, and labour market conditions in general, may have contributed to the quantitative cross-country differences in Southern Europe. From the descriptive analysis of employment, occupational distribution and segregation, and taking into account the predictions of the alternative theoretical explanations, the expectation was that occupational segregation not only was not a determinant explanation for participation differences, but actually contributed to the puzzling nature of female labour force participation in Portugal. Simple regression results have initially corroborated this idea: occupational segregation is not the reason behind higher female labour force participation in Portugal. Not only Portugal was the most segregated market in Southern Europe but was also the country where occupational segregation measures produced the most negative outcome in terms of working hours.<sup>14</sup> However, when controlling for individual unobserved heterogeneity, occupational segregation measures had actually a positive effect on female labour force participation. In fact, occupational segregation has not been a limiting factor in the growth of female labour force, contrary to what would be expected according to Blau-Weisskoff (1972), since, as mentioned, during the period analyzed, occupational segregation in Portugal has been high and increasing but so has female employment.

Although occupational segregation may be negatively correlated with employment rates, there might be a scope for labour market characteristics, beyond female

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<sup>14</sup>These results are in line with the participation equations estimated in Lewis and Shorten (1991).

labour supply decisions, to play a role either through labour demand or, eventually, through institutions. In fact, the second term of Oaxaca decomposition, when interpreted as an indicator of the sensitivity of the labour market of each country, assigns a positive role to labour market constraints and therefore a potential positive role to labour demand constraints in accounting for cross country differences in working hours.

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## Appendices

Table 12: Sample mean values (married females) - 1997

	Portugal	Spain	Italy	Greece
Hours	24.696 (20.940)	17.021 (20.529)	16.706 (18.773)	17.314 (20.577)
Age	43.536 (12.110)	43.589 (11.375)	44.168 (10.933)	43.647 (11.858)
Age Squared	2041.953 (1048.696)	2029.380 (1006.637)	2070.337 (973.316)	2045.630 (1041.624)
Presence of Children	0.383 (0.486)	0.388 (0.487)	0.377 (0.485)	0.366 (0.482)
Schooling (years)	9.638 (1.887)	10.576 (2.818)	10.268 (2.537)	10.971 (2.928)
Experience	4.795 (6.830)	2.340 (5.208)	3.738 (6.540)	3.199 (6.094)
Experience Squared	69.630 (119.508)	32.586 (86.567)	56.736 (112.604)	47.352 (103.645)
Segregation Index (region)	0.407 (0.074)	0.458 (0.045)	0.399 (0.044)	0.320 (0.063)
Segregation Index (education and region)	0.425 (0.093)	0.500 (0.081)	0.431 (0.108)	0.340 (0.088)
Legislators, senior officials and managers	0.032 (0.177)	0.032 (0.177)	0.004 (0.066)	0.040 (0.197)
Professionals	0.034 (0.182)	0.058 (0.235)	0.074 (0.261)	0.059 (0.236)
Technicians	0.048 (0.214)	0.031 (0.173)	0.042 (0.200)	0.022 (0.148)
Clerks	0.067 (0.250)	0.036 (0.187)	0.101 (0.301)	0.056 (0.230)
Service, shop and market sales workers	0.126 (0.331)	0.064 (0.245)	0.068 (0.252)	0.055 (0.227)
Skilled agricultural and fishery workers	0.093 (0.290)	0.018 (0.133)	0.016 (0.125)	0.103 (0.304)
Craft workers	0.056 (0.229)	0.015 (0.123)	0.033 (0.179)	0.031 (0.174)
Plant and machine assemblers	0.023 (0.149)	0.009 (0.093)	0.012 (0.110)	0.007 (0.085)
Elementary Occupations	0.110 (0.313)	0.070 (0.255)	0.039 (0.195)	0.036 (0.186)
Secondary sector	0.110 (0.313)	0.041 (0.199)	0.069 (0.253)	0.057 (0.232)
Tertiary sector	0.358 (0.480)	0.268 (0.443)	0.292 (0.455)	0.247 (0.431)
Private sector	0.432 (0.495)	0.225 (0.417)	0.236 (0.425)	0.302 (0.459)
Obs.	2787	3455	4160	2874

**Source:** European Community Household Panel, 1997  
(9 occupational categories).

Table 13: Sample mean values (married females) - 2001

	Portugal	Spain	Italy	Greece
Hours	25.565 (19.763)	17.690 (19.879)	16.461 (18.610)	18.518 (20.858)
Age	42.866 (12.297)	43.231 (11.305)	44.218 (11.028)	44.148 (11.352)
Age Squared	1988.640 (1057.961)	1996.706 (998.813)	2076.818 (985.504)	2077.892 (1009.715)
Presence of Children	0.410 (0.492)	0.382 (0.486)	0.390 (0.488)	0.384 (0.486)
Schooling (years)	10.178 (2.514)	11.130 (3.171)	10.774 (2.375)	10.953 (2.664)
Experience	5.519 (7.644)	2.664 (5.763)	3.831 (7.150)	3.522 (6.728)
Experience Squared	88.864 (159.651)	40.303 (112.006)	65.776 (145.128)	57.655 (136.795)
Segregation Index (region)	0.429 (0.096)	0.462 (0.039)	0.401 (0.042)	0.341 (0.058)
Segregation Index (education and region)	0.445 (0.105)	0.489 (0.069)	0.434 (0.089)	0.377 (0.079)
Legislators, senior officials and managers	0.036 (0.185)	0.026 (0.159)	0.008 (0.088)	0.043 (0.203)
Professionals	0.052 (0.221)	0.073 (0.260)	0.085 (0.278)	0.062 (0.241)
Technicians	0.060 (0.238)	0.049 (0.215)	0.040 (0.196)	0.026 (0.160)
Clerks	0.078 (0.269)	0.044 (0.206)	0.112 (0.315)	0.069 (0.254)
Service, shop and market sales workers	0.116 (0.321)	0.089 (0.285)	0.070 (0.255)	0.068 (0.252)
Skilled agricultural and fishery workers	0.076 (0.264)	0.020 (0.140)	0.017 (0.130)	0.096 (0.294)
Craft workers	0.065 (0.246)	0.023 (0.150)	0.030 (0.171)	0.026 (0.158)
Plant and machine assemblers	0.026 (0.159)	0.010 (0.101)	0.009 (0.094)	0.007 (0.085)
Elementary Occupations	0.133 (0.340)	0.081 (0.272)	0.034 (0.182)	0.050 (0.217)
Secondary sector	0.123 (0.328)	0.057 (0.232)	0.061 (0.239)	0.052 (0.223)
Tertiary sector	0.434 (0.496)	0.328 (0.470)	0.317 (0.465)	0.297 (0.457)
Private sector	0.468 (0.499)	0.287 (0.452)	0.243 (0.429)	0.336 (0.473)
Obs.	2619	2707	3349	2313

Source: European Community Household Panel, 2001  
(9 occupational categories).

Table 14: Occupations description - 18 categories

Occupation	Description
1	Legislators, senior officials and corporate managers
2	Managers of small enterprisers
3	Physical, mathematical, engineering and health professionals
4	Teaching professionals
5	Other professionals
6	Physical, mathematical, engineering and health associate professionals
7	Teaching and other associated professionals
8	Clerks
9	Personal and protective workers
10	Models, sales persons and demonstrators
11	Skilled agricultural and fishery workers
12	Extraction and building traders workers
13	Metal, machinery, precisions, handicraft, printing and related trades workers
14	Stationary-plant, drivers and mobile-plant and related operators
15	Machine operators and assemblers
16	Sales and services elementary occupations
17	Agricultural, fishery and related workers
18	Mining, construction, manufacturing and transport workers

**Source:** European Community Household Panel