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Male-female Labour Market Participation and Wage Differentials in Greece

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Abstract:

This paper is an empirical study of the development of labour market participation and wage differentials between males and females in Greece between 1988 and 1994. There is little known about the position of women in the Greek labour market. This paper uses recent survey data generated by the National Statistical Service. The decision to engage in paid employment and the resulting remuneration are studied using selectivity corrected earnings estimations. Oaxaca & Ransom decompositions and counterfactual analysis show that the adverse treatment of female labour market participation is the largest identifiable reason why the wage gap is there and why it increased between 1988 and 1994.

1. INTRODUCTION

The Greek labour market experienced drastic legislative, economic and social developments during the last three decades. Legislative changes started taking place during the late 1970s as a result of the preparation for and the joining of the European Union, henceforth EU, in the early 1980s. Economic changes have been taking place throughout the period as a result of the post-war transformation of the Greek economy. Social changes of considerable significance, such as reductions in fertility and increases in female education, have also made a mark in the development of the labour market. Legislative, economic and social changes have had a profound effect on the relative position of men and women in the labour market.

On the legislative side, in the late 1970s there was a gradual abolition of differences in the binding minimum wage rates for men and women from collective bargaining. In the early 1980s new legislation put men and women on an equal foothold with respect to family, employment, social affairs and ratified the EU sex equality directives.

On the economic side, female labour market activity rates experienced a drastic decline in the 1960s, which coincided with large emigration and urbanisation increases along with an exodus from the agricultural sector. The rate of economically active females was stable in the 1970s and then started increasing considerably in the early 1980s. Note that increases in female economic activity rates in the 1980s took place during a period of rather poor performance of the Greek economy and an employment shift away from manufacturing and towards services.

Female economic activity increased mainly in urban areas, amongst prime female age groups (20-45) and in the paid employment sector. To a large degree, the reasons for the increased female economic activity have been of a social nature. Emancipation implied that females not only chose to study more often and to a higher level, but they also chose to try to use their studies in the labour market. First marriage mean age increased and mean number of children decreased considerably, allowing females to pursue their labour market objectives. Female labour market economic activity rate was

29 percent in 1981, increased to 41 percent in 1991 and reached 47 percent in 1996.

However, this considerable increase in the supply of female labour was not matched by corresponding demand changes, as the level of female employment saw only far smaller increases. The last two decades experienced clear manifestations of female excess labour supply in terms of both increased female unemployment rates (from 12.4 percent in 1988 to 14.9 percent in 1994), as well as persistently higher than average male unemployment rates (female rates were 12-15 percent, while male rates were 5-7 percent). It is important to note that, despite the recent remarkable increases in female economic activity, Greece still has one of the lowest female economic activity rates among EU countries.

By contrast to female economic activity rate changes, the male-female wage gap has seen few changes since the 1960s. During the two decades leading to 1982, the wage gap remained almost constant, with female earnings some 33 percent below male earnings. A 40 percent one-off increase in the national minimum wage introduced in January 1982, reduced the wage gap to about 22 percent by 1985. Since 1985 the wage gap has been increasing slowly. Strangely, at least on first sight, post-1985 increases in the wage gap took place during the very period when extensive EU rules on sex equality were being incorporated in the Greek legal system and implemented in the Greek labour market. The post-1985 slow increase of the wage gap, despite the newly implemented EU legislation, has been viewed by policy circles as a manifestation of lack of effectiveness of the legislation.

An interesting picture arises when one considers socioeconomic and legislative changes working in tandem. Socioeconomic changes led to higher female labour supply which was only partly absorbed by the market, resulting in higher female employment *and* unemployment along with lower female wages. One could try to explain the perseverance of the wage gap using the observation that new labour market entrants typically command lower wages, thus depressing the mean wage of the group they belong to.

Legislative changes designed to promote the position and pay of females in employment clearly improved the lot of employed females, but at the cost of making

female employment more costly than it was before. Clearly, other things equal, legislative changes led to more females seeking employment, less females being hired and higher female wages.

The net outcome of socioeconomic and legislative changes working together is far from clear on *a priori* grounds. This paper assumes a beckerian human capital theoretical framework and estimates a two stage model where the first stage estimates paid employment participation and the second stage estimates the conditional paid employment earnings. Estimations are carried out for two representative cohorts which are six years apart.

The paper uses two family expenditure surveys conducted by the Greek National Statistical Service in 1988 and 1994. The first part of the paper estimates earnings and participation rates and calculates male-female pay differentials[1]. Differentials are decomposed in accordance with the technique developed by Neumark (1988) and Oaxaca & Ransom (1988) and (1994). The male-female wage gap is split into its explained (often referred to as characteristics or productivity) and unexplained (often referred to as market or discrimination) components. Differentials derived from the 1988 and 1994 samples are examined to identify the individual constituents of the observed wage gap, with specific reference to direct and indirect remunerative effects of participation on individuals.

The second part of the paper examines the development of participation and wages between 1988 and 1994. The use of the appropriate counterfactual analysis makes possible the examination of the development of the productivity and market changes after controlling for possible changes in the sample composition between the two points in time under consideration. Moreover, the use of the Oaxaca & Ransom decompositions enables the analysis to control for possible changes in macroeconomic conditions facing the two cohorts. This last point is particularly important because of the major changes that the Greek economy in general and labour market in particular have been undergoing

[1] Previous relevant studies on the male-female pay differentials in Greece are those of Kanellopoulos (1982) using data pertaining to 1964 and Psacharopoulos (1983) using 1977 data. Both estimate traditional mincerian type earnings functions. They employ the Oaxaca (1973) technique to decompose the gross gender pay gap into the part due to differences in productive characteristics and the rest which is identified as the upper limit of discrimination. While the percentage of the gross gender gap explained by differences in productive characteristics depends upon the broad or narrow definition of such variables, both studies

since the early 1980s due to the new constraints and possibilities opened up by EU membership and due to the policies followed by the post-1981 government.

This paper shows that socioeconomic and legislative changes resulted in increased female economic activity, which has been translated into excess female labour supply. Despite extensive legal protection, the wage gap remains unchanged and females have to pay a remunerative participation penalty in order to be in employment. This participation penalty is shown to have a large discriminatory element in it. Once the participation penalty has been accounted for, the remaining wage gap can be largely explained by observed male-female productivity differences.

The result in this paper show that, almost exclusively, discrimination against females confines itself to the participation process. This is a striking result because it questions the current anti-discrimination rules, which concentrate on what happens within employment, leaving participation issues relatively undisturbed. By contrast, the main conclusion of the paper is that policies designed at combating the male female wage gap in the Greek labour market should address above all participation issues.

documented a large female earnings net disadvantage.

II. THE MODEL

A. Discrimination and paid employment participation

The paper uses a beckerian earnings function as its starting point.

$$\ln\left(\widetilde{W}_s\right) = \overline{X}_s'\beta_s \qquad s = m, f, p \qquad (1)$$

This paper applies the Oaxaca & Ransom (1988) and (1994) pooled model decomposition technique which is based on estimating (1) for three different samples: males, females and pooled. The pooled model has been developed as a consequence of appreciating how useful but how limiting at the same time the empirical Oaxaca/Blinder (1973) decomposition models were.

All discrimination studies make an implicit assumption as to what earnings would be in the absence of discrimination. This is called the non-discriminatory market structure. It is important that the assumed non-discriminatory wage structure is as realistic as possible. Note the role played by pooled estimation in this context. Pooling males and females together and estimating their earnings as if gender did not exist, provides estimates of the actual remunerative value attached by the (assumed non-discriminatory) market to observed characteristics. It should be noted that using the pooled model assumes a non discriminatory wage structure, which on average coincides with the actual wage structure and a non-discriminatory labour market, which pays the same total wages as the actual market.

have to assume that in the absence of discrimination, total wages paid in the market would have to be other than the currently paid total wages. After all it is only sensible to expect that reducing discrimination would not influence total demand for labour in the economy in any wider way.

Second, assuming a model which explicitly estimates current total earnings in the economy, allows counterfactual analysis to isolate the development of macroeconomic changes in the Wage Gap using estimates from equation (1).

The male-female wage gap, $WG = \ln(\tilde{W}_m) - \ln(\tilde{W}_f)$, can be decomposed into three terms as follows

$$\ln(WG_{mf} + 1) = X_m(\beta_m - \beta_p) + X_f(\beta_p - \beta_f) + (X_m - X_f)\beta_p \qquad (2)$$

Terms 1 and 2 of the right hand side of Equation (2) represent the unexplained part of the wage gap and term 3 represents the explained part.

The decision to take paid employment or not is represented by Equation (3). Heckman (1979) showed that estimating Equation (3) is a necessary step for deriving unbiased earnings estimates from the estimation of Equation (2).

$$L_s = Z_s'\gamma_s + u_s, \qquad s = m, f, p \qquad (3)$$

Applying Heckman's method of selectivity correction, Equation (2) is re-written as follows.

$$\ln(\tilde{W}_s) = \overline{X}_s'\beta_s + \sigma_s\lambda_s \qquad s = m, f, p \qquad (4)$$

After the inclusion of selectivity terms in the earnings equation, the Wage Gap decomposition has to be re-calculated in order to take into consideration the impact of the participation decision. Equation (2) is re-written as follows.

$$\begin{aligned}\ln(G_{mf} + 1) = {} & \overline{X}_m'(\beta_m - \beta_p) + \overline{X}_f'(\beta_p - \beta_f) + (\overline{X}_m - \overline{X}_f)'\beta_p + \\ & \lambda_m(\sigma_m - \sigma_p) + \lambda_f(\sigma_p - \sigma_f) + \sigma_p(\lambda_m - \lambda_f)\end{aligned} \qquad (5)$$

The economic interpretation of the terms of Equation (5) is important. The first two terms jointly, represent the unexplained part of the wage gap that is not due to any participation effects (a conventional discrimination effect). The third term represents the explained part of the wage gap that is not due to any participation effects (a conventional characteristics affect). If the market were to ignore participation differences, terms one to three would estimate the origin of the wage gap.

Terms 4 and 5 jointly, represent the part of the wage gap which can be attributed to the unexplained influence of participation differences (one could view these terms as an estimate of discrimination).[2] Term 6 represents the part of the wage gap which can be attributed to the explained influence of participation differences.

B. Indirect Wage Gap effects of participation.

Interpreting the last term in Decomposition (5) as an explained (by participation propensities differences) part of the Wage Gap can be problematic. The reason is that treating $\sigma_p(\lambda_m - \lambda_f)$ like a conventional characteristics estimate (that is, a part of the Wage Gap explained by observed data differences), is tantamount to treating the variable λ as observed individual data. Clearly, this is not the case, since λ is an estimate derived from the first stage estimations. As an estimate, λ will be partly explained by the observed explanatory variables in the first stage and partly unexplained[3]. It follows that the explanatory power of λ in the (second stage) earnings estimation will also be (indirectly) partly explained by the (first stage) explanatory variables and partly unexplained. In order to attribute effects correctly, what appears to be the fully 'explained' effect of λ in the earnings decomposition $\sigma_p(\lambda_m - \lambda_f)$, has to be further decomposed into the part that can be explained by the first stage explanatory variables and the part that cannot. Only then will Decomposition (5) be able to provide a complete overall picture of explained and unexplained wage gap differences.

The necessary adjustment is relatively simple to perform. Gomulka and Stern (1990)

[2] A detailed explanation and discussion of the decomposition of selection terms can be found in Mavromaras and Rudolph (1997). Note the importance of the Neumark/Oaxaca & Ransom pooled coefficients in Decomposition 5. Unlike the 'male' or 'female' models, here coefficient differences are multiplied by the correct data, the difference between male (female) and pooled coefficients by the male (female) data, and the difference between the male and female data by the pooled coefficients. The fact that this is a much more realistic decomposition technique is revealed by the always higher explained estimates than either the male or the female models can achieve.

[3] The technique for estimating discrimination effects in selectivity models used in this paper is explained in Mavromaras (1999). This paper utilises the technique in order to provide an overall measure of discrimination. The first stage reflects the selection / participation side and the second stage reflects the

have shown that differences involving non-linear terms of the $\sigma_p(\lambda_m - \lambda_f)$ type can be decomposed with the use of a simple counterfactual. Define counterfactual $\lambda(Z_f, \gamma_m) = \phi(Z_f' \gamma_m) / \Phi(Z_f' \gamma_m)$, which represents the selection correction term that would have been generated using female data with male coefficients, that is, a measure of the participation propensity that females would have had, had they received the market treatment of their male counterparts. Simplify notation and rewrite the last term of Equation 5 using counterfactual $\lambda(Z_f, \gamma_m)$ as follows:

$$\begin{aligned} &\sigma_p\{\lambda(Z_m, \gamma_m) - \lambda(Z_f, \gamma_f)\} \\ &= \sigma_p\{\lambda(Z_m, \gamma_m) - \lambda(Z_f, \gamma_m)\} + \sigma_p\{\lambda(Z_f, \gamma_m) - \lambda(Z_f, \gamma_f)\} \end{aligned} \tag{6}$$

The intuition behind the way the RHS of Equation (6) enters the earnings estimations is important in the context of this paper. The first term in curly brackets, $\{\lambda(Z_m, \gamma_m) - \lambda(Z_f, \gamma_m)\}$, is an explained effect as it combines the differences between male and female data multiplied by male coefficients. Crucially, note that the explanation provided in the earnings equation is based on observed characteristics differences in the participation process, the differences between Zm and Zf. Hence, the term in curly brackets estimates the indirect effect of the observed factors which determine participation (the Zs) on earnings differentials. Call this the indirect explained effect of participation on the wage gap.

The second term in curly brackets, $\sigma_p\{\lambda(Z_f, \gamma_m) - \lambda(Z_f, \gamma_f)\}$, is an unexplained effect as it combines the female data set with the difference between the male and female coefficients. Since this part of the wage gap is clearly not explained by the participation estimation, it would be mistaken to interpret it as a wage gap difference which is explained by the earnings estimation. Therefore, it would be wrong to include it in the explained proportion of the Wage Gap, as the interpretation of Decomposition (5)

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earnings side.

implicitly suggested in the previous section. Intuitively seen, the two terms in the RHS of Equation 6 represent the indirect wage gap impact of the explained and unexplained part of the participation process. Taking on board the changes introduced by Equation 6, Equation 5 is re-written in order to incorporate indirect explained and unexplained effects resulting from the participation process.

$$\begin{aligned}&\ln(G_{mf}+1)=\overline{X}_m'(\beta_m-\beta_p)+\overline{X}_f'(\beta_p-\beta_f)+(\overline{X}_m-\overline{X}_f)'\beta_p+\\&\lambda_m(\sigma_m-\sigma_p)+\lambda_f(\sigma_p-\sigma_f)+\\&\sigma_p(\lambda_m-\lambda_{fm})+\sigma_p(\lambda_{fm}-\lambda_f)\end{aligned}\qquad(5.1)$$

C. The development of the Wage Gap and participation.

Counterfactual analysis is used to study the change over time in the explained and unexplained parts of the Wage Gap. Counterfactual analysis is useful in this context because it takes into account any observed changes in the composition of the samples compared and changes in macroeconomic conditions[4], presented by the non-discriminatory (pooled) market structure estimates. The change in the Wage Gap between 1988 and 1994 can be written as follows.

$$\Delta WG_{9/8}=WG_9-WG_8\qquad(7)$$

Define WG_8^9 as the wage gap that would have existed if the 1980s cohort were faced with the 1990s market conditions.

[4] For examples of this technique see Wellington (1993), Dolton and Mavromaras (1994), Mavromaras and Rudolph (1997). This technique compares essentially different cohorts and their estimation results, accounting for the observable changes in the overall composition of cohorts over time. It is not the same as panel analysis where individual observable changes can be accounted for and time – invariant unobservable individual differences are differenced out of the estimations. Although the use of one or the other estimation is more than often data driven (for example, this paper could not use panel technique) it is useful to bear in mind the differences in the results produced by them.

$$W_8^9 = \overline{X}'_{m8}(\beta_{m9} - \beta_{p9}) + \overline{X}'_{f8}(\beta_{p9} - \beta_{f9}) + (\overline{X}_{m8} - \overline{X}_{f8})'\beta_{p9} + \lambda_{m8}(\sigma_{m9} - \sigma_{p9}) + \lambda_{f8}(\sigma_{p9} - \sigma_{f9}) + (\lambda_{m8} - \lambda_{f8})\sigma_{p9} \quad (8)$$

Combine Equations (6), (7) and (8) to decompose the over time change in the Wage Gap as follows.

$$\begin{aligned}\Delta WG_{9/8} = {} & \overline{X}'_{m8}(\beta_{m9} - \beta_{m8}) - \overline{X}'_{m8}(\beta_{p9} - \beta_{p8}) + \\ & \overline{X}'_{f8}(\beta_{f8} - \beta_{f9}) - \overline{X}'_{f8}(\beta_{p8} - \beta_{p9}) + \\ & \beta'_{m9}(\overline{X}_{m9} - \overline{X}_{m8}) + \beta'_{f9}(\overline{X}_{f8} - \overline{X}_{f9}) + \\ & \beta'_{p9}(\overline{X}_{m8} - \overline{X}_{f8}) - \beta'_{p8}(\overline{X}_{m8} - \overline{X}_{f8}) + \\ & \lambda_{m9}(\sigma_{m9} - \sigma_{p9}) - \lambda_{m8}(\sigma_{m8} - \sigma_{p8}) + \\ & \lambda_{f9}(\sigma_{p9} - \sigma_{f9}) - \lambda_{f8}(\sigma_{p8} - \sigma_{f8}) + \\ & \sigma_{p9}(\lambda_{m9} - \lambda_{fm9}) - \sigma_{p8}(\lambda_{m8} - \lambda_{fm8}) + \\ & \sigma_{p9}(\lambda_{fm9} - \lambda_{f9}) - \sigma_{p8}(\lambda_{fm8} - \lambda_{f8})\end{aligned} \quad (9)$$

Decomposition (9) splits the change in wage gap into 16 separate terms. Terms 1 to 4 estimate the degree to which the observed changes in the wage gap have been the result of changes in earnings discrimination. Note that these changes are net of any observed changes in the non-discriminatory (pooled) earnings estimates. The sum of terms 1 to 4 reveals the net changes in the wage gap which were the result of changes in discrimination. Terms 4 and 5 estimate the changes in the wage gap due to changes in male and female observed earnings characteristics respectively. The sum of terms 4 and 5 reveals the wage gap impact of observed productivity changes. Terms 7 and 8 estimate the changes in the wage gap due to changes in the non-discriminatory market structure, by multiplying the changes in the pooled coefficients by the observed male female data differences. The sum of terms 7 and 8 represents the wage gap impact of estimated changes in the non-discriminatory environment.

The remaining 8 terms estimate the wage gap impact of changes in the participation process. Empirically, terms 9 to 16 prove to be very influential. Terms 9 to 12 estimate

the direct wage gap impact of the unexplained part of participation. Terms 13 to 16 follow the logic of Equation 6 by decomposing changes in the 'explained' direct participation effect, into changes in *indirect explained* effects (terms 13 and 14) and changes in *indirect unexplained* effects (terms 15 and 16). The indirect explained estimates are based on changes in participation data. The indirect unexplained estimates are based on changes in participation coefficients.

III. The Data

The paper uses data drawn from the two recent Family Expenditure Surveys (FES) in Greece conducted by the National Statistical Service in 1988 and 1994 throughout the entire country[5]. These are random surveys of private households in Greece and include full time male and female workers for whom information on earnings and socioeconomic characteristics is available. Since the decision examined in this paper is that of employment, persons below 17 and above 60 are excluded from the sample used in this study. Full time students and pensioners are also excluded.

In order to make the two data sets comparable for counterfactual analysis, only variables which have the same definition in both surveys were used. Although this restricted the models that could be estimated, experimentation with the (richer) 1994 data set reveals that decompositions are not affected in any major way by the exclusion of the necessary variables to make the two sets comparable. The log of weekly wages in 1994 prices has been used as the earnings variable for those in paid employment. Apart from the usual human capital variables like education, age and other, the data sets contain a number of interesting variables regarding participation decisions. Household size and composition are well described in both surveys. Type of accommodation and home ownership are also available in both surveys. These are extremely valuable identifying variables for the first

[5] The 1988 survey was carried out between November 1987 and October 1988, and the 1994 survey was carried out between November 1993 and October 1994. For a full description of the survey's design,

stage estimation of employment outcomes, especially where these outcomes may be affecting wages in a gender-related manner. An overview of the data is provided in Table 1 and descriptive statistics for both surveys, along with variable definitions are in the Appendix.

Table 1

Paid Employment in 1988 and 1994

	1988 Cohort			1994 Cohort		
	Paid Employment Sample		Complete Sample	Paid Employment Sample		Complete Sample
	Cases	Wage	Cases	Cases	Wage	Cases
Males	2197	10.6697	4591	2301	10.6319	4588
Females	1090	10.4278	5355	1407	10.3434	5115
Total	3287		9946	3709		9703
Wage Gap		0.2419			0.2885	

Note: Log weekly wages in 1994 prices.

Table 1 confirms a general trend towards paid employment in the Greek labour market. It is mainly female employees who take up the new opportunities. Although female participation has increased, it still remains almost half of the male participation. The successive austerity and stabilization programmes, combined with recession between the years 1988 and 1994 have taken their toll regarding pay; mean 1994 wages are below the 1988 level. Interestingly, females who made considerable gains in employment volume, lost some 8 percent of their mean wage. By contrast, males who gained very little in employment volume, lost less than four percent of their mean wage. Gross wage and participation rates convey the message of females underbidding and displacing males from paid employment, at the cost of lower wages. The next section examines these facts in a multivariate context.

IV. Estimations and results

coverage and response rate, see National Statistical Service of Greece (1992).

A. Introducing participation estimates

In the discussion to follow participation estimates play a crucial role. This section explains the constituents of participation effects using the estimates of Equation (5.1) for both cohorts found in Tables A5 and A6. For each (sub)sample of each cohort a mean participation propensity, λ, and the earnings coefficient of the participation propensity, σ, is presented in Table 2 and it is necessary to examine them in some detail.

Table 2

Participation propensities and their remuneration estimates

	Pooled		**Female**		**Male**		**Counter -factual**
	λ_p	σ_p	λ_f	σ_f	λ_m	σ_m	λ_{fm}
1988 cohort	0.9272	-0.2841*	1.1737	-0.2098*	0.7616	-0.1006*	0.7483
1994 cohort	0.8421	-0.4751*	0.9834	-0.4320*	0.7232	-0.2034*	0.8820

Note: * denotes significance at the 1% level. Detailed results in Tables A5 and A6.

By definition λ is a positive number for participants and tends to zero as the probability of participation tends to one.[6] Hence individuals with lower participation propensities have higher values of λ. Remembering that at this stage comparisons between the 1988 and 1994 cohorts cannot as yet be carried out, note that females have larger values of λ in both cohorts. Counterfactual λ_{fm} (female data with male coefficients) in the last column indicates that a large part of the difference in male-female participation propensities is due to differences in coefficients rather than data in the first stage estimations, especially

[6] $\lambda(x) = \phi(x)/\Phi(x)$ which is always positive. Note as x tends to infinity $\lambda(x)$ tends to zero.

in the 1988 cohort.

Coefficient σ is negative and significant at the one percent level throughout. The sign of σ suggests in an unambiguous fashion that the market views λ as a negative attribute of employees. The size of the negative σ represents the degree to which low participation propensity is penalised by the market. Females suffer a much higher penalty in both cohorts. The overall picture that arises is that females on average posses more of the low participation attributes than males (that is, λ_f is larger than λ_m), and that females are also penalised more per unit of each low participation attribute than their male counterparts (that is, $|\sigma_f|$ is also larger than $|\sigma_m|$). It is time now to see how participation estimates fit into the wage gap picture.

B. Wage Gap Decompositions

Earnings Equation 4 is estimated for all three samples (male, female and pooled) and Equation 5.1 decompositions are presented in Table 3. Positive (negative) estimates represent factors which favour males (females). The explained and unexplained effects are presented separately for the first and second stage of the estimation in Rows 1 to 5, with the corresponding numbers of the Equation (5.1) terms they represent. Rows 6 and 7 provide the total explained/unexplained split of the wage gap.

Table 3

Wage Gap Decompositions

Estimation results	**Terms in Equation 5.1**	**1988 cohort**	**1994 cohort**

First stage participation estimation			
Row 1: Participation indirect explained	6	-0.0038	0.0754
Row 2: Participation indirect unexplained	7	0.1208	0.0482
Row 3: Participation direct unexplained	4,5	0.0526	0.1541
Second stage earnings estimation			
Row 4: Unexplained earnings	1,2	0.0728	0.0578
Row 5: Explained earnings	3	-0.0007	-0.0469
Row 6: Total Explained (direct and indirect)	1,2,6	0.0690	0.1332
Row 7: Total Unexplained (direct and indirect)	3,4,5,7	0.1728	0.1554
Row 8: Total wage gap	1 to 7	0.2418	0.2886

Note: Detailed estimation results can be found in Appendix Tables A5 and A6. This Table reports combined nepotism and discrimination coefficients for both stages as the unexplained part of the estimation.

Table 3 contains several interesting results. Conventional second stage productivity estimates (Row 4) show that females are lagging behind males regarding observed human capital. Conventional discrimination estimates (Row 5) are negligible for 1988, showing a small female advantage in the 1994 cohort.

Most of the wage gap is the result of differences in participation propensities (Rows 1 to 3). In both cohorts some 70 percent of the decomposed effects are attributable to the indirect impact of the participation process on earnings differences (through the selection variable). This is an important result which vindicates the use of the two stage process for

the analysis of participation and earnings differences. Only a small part of the participation impact on the wage gap is explained by individual characteristics, showing no observed differences in 1988 and only a male advantage in 1994. The large unexplained part of the participation impact on the wage gap strongly suggests that males are favoured by the market, especially in 1994 where more than two thirds of the wage gap can be attributed to the estimates in Rows 2 and 3.

The interpretation of the participation effects must be done with care. If one accepts the argumentation introduced by Equation 6 (that is, that the only truly explained part of the participation effects is that which can be attributed to data differences in the participation estimations - presented in Row 1 of Table 3), then the participation process could be called highly discriminatory.

However, one should be cautious about such an interpretation, as it assumes that productivity differences have been explained adequately by the estimations. Although the data used in this paper includes several important productivity variables, the way legislative differences may result in a marginal value product differential between male and female labour may not be captured adequately by the data. Some differences will be captured by existing variables. For example, the added cost to the employer of staff pregnancies should be captured by age and sector dummies, the added cost to the employer of higher absences should be captured by the children and marriage dummies. To the degree that the data used does not capture gender related differences in marginal value product, the impact of such differences on the wage gap can be mistaken as

discrimination. At the same time, to the degree that employers perceive that females are in a harder position in terms of finding and retaining employment, the estimates of this paper may simply reflect rent seeking behaviour by employers.

The important point in the present context is that in Greece marginal value product differences generated mainly by EU legislation, coincided with rate of pay protection generated principally by national minimum wage rules. This paper reveals a complex market reaction in an environment with strongly increasing female labour supply. Lower female marginal value product depresses demand for female labour, and better working conditions increase female labour supply. The resulting excess supply depresses wages and increases female employment. Minimum wage rules kick in at some point and stop wages from dropping further. Female employment cannot improve any more and excess female labour supply is maintained. Females who wish to be employed face tougher competition and have to pay a premium in terms of lower wage, some of which may well be the result of discriminating employer behaviour.[7]

C. Comparison of different decompositions

The comparison of different decompositions based on the same data in Table 4 can be informative. Comparing the male and female decompositions with the pooled one reveals that the pooled explains more of the wage gap. This comes as no surprise as the pooled model uses more information (the pooled estimation) and assumes a more realistic non-

[7] A well informed employer will spot such effects and act by offering lower female wages. The observed market response would be in this case that the bottom of the wage distribution will be censored by minimum wage and all wages above that level will be depressed by tougher competition.

discriminatory wage structure. One of the main advantages of the pooled model is that (unlike the male and female models) it assumes that in the absence of discrimination the total wages paid in the economy would be equal to the observed total wages paid. All that would happen in a non-discriminatory economy would be that jobs would be re-shuffled in order to eliminate discriminatory pay differences, but the total capacity of the economy assumed by the non-discriminatory wage structure is identical to the actual capacity.

Table 4

Comparison of several decompositions

Model	Male		Female		Pooled (only direct)		Pooled (direct and indirect)	
Effect/cohort	1988	1994	1988	1994	1988	1994	1988	1994
1st stage Unexplained	0.0166	-0.0169	0.0092	-0.0252	-0.0007	0.0469	-0.0007	-0.0469
1st stage Explained	0.0556	0.0278	0.0630	0.0361	0.0728	0.0578	0.0728	0.0578
2nd stage Unexplained	0.0832	0.1653	0.0832	0.1653	0.0526	0.1541	0.0526	0.1541
2nd stage Explained	0.0865	0.1124	0.0865	0.1124	0.1170	0.1236	-0.0038(Ex) 0.1208(Un)	0.0754(Ex) 0.0482(Un)
% of Total Explained	59%	51%	42%	51%	78%	63%	28%	46%
Total Wage Gap	0.2418	0.2886	0.2418	0.2886	0.2418	0.2886	0.2418	0.2886

Investigation of the penultimate row in Table 4 shows how the pooled model explains more of the wage gap than either the male or the female model. Notwithstanding the superiority of the pooled model, it is worth noting how re-interpreting results through the inclusion of indirect effects in the analysis, decreases the overall explained part of the wage gap considerably. The proportion of explained to unexplained wage gap drops from 78% (63%) to 28% (46%) for the 1988 (1994) cohort in Table 4. Clearly, restricting

indirect effects to be zero (that is, treating λ purely as data) seriously and mistakenly under-estimates discriminatory effects. This is an important result the universality of which should be tested with further data sets.

D. Counterfactual Estimates of the Development of the Wage Gap

Table 1 shows that the total wage gap between males and females changed between 1988 and 1994 by almost five log points in favour of males. This section decomposes this change into its first and second stage explained and unexplained constituents.[8] Establishing the reason for wage gap changes can have important policy ramifications. For example, if it is established that females are losing out over time because their observed human capital is deteriorating in relation to that of males, a sensible policy recommendation would be that education and training differentials should be looked at more carefully. If, however, relative human capital remains constant and the wage gap increases nonetheless, other factors should be examined, such as gender related employer and employee attitudes.

Table 5 summarises the terms of Counterfactual 9. The message is clear. Looking at the second stage estimates, one can see that, although female productivity improved between 1988 and 1994, male productivity improved faster. The net productivity effect was in favour of males (the difference between Rows 5 and 6). A substantial reduction in the

[8] It should be noted that while a large proportion of males are self-employed in the two cohorts, females typically either engage in paid employment or stay out of the labour market altogether. This fact makes the deterioration of the relative female pay even more important because females have fewer outside options regarding employment than males. An alternative way to look at the deterioration of female earnings would be that, it is because males have better outside options that they retain their remunerative advantage in paid employment. It should also be noted that between 1988 and 1994 the Greek economy performed rather poorly. Any development in the wage gap during the 1988-1994 period could also be attributable to males

wage gap is attributable to the unexplained part of the earnings estimates (Row 4). If anything, the market seems to be remunerating the females who are in employment in 1994 better than it remunerated their 1988 counterparts. Hence, Table 5 suggests that, if participation effects were absent, relative female earnings would have improved between 1988 and 1994.

and females treated differently during difficult economic times.

Table 5

Counterfactual Wage Gap decompositions

Total Wage Gap change 1988-1994	0.0468
Attributable to first stage selection estimates	
1. Due to changes in unexplained participation	0.1015
2. Due to changes in unexplained indirect participation	-0.0725
3. Due to changes in explained indirect participation	0.0792
Total WG change due to participation	0.1080
Attributable to second stage earnings estimates	
4. Due to changes in unexplained earnings	-0.0510
5. Due to changes in male productivity	0.1001
6. Due to changes in female productivity	-0.0747
7. Due to changes in the non-discriminatory wage structure	-0.0356
Total WG change due to earnings estimates	-0.0612

Participation estimates convey a far less favourable picture regarding the relative female position. Overall participation changes increased the wage gap considerably. Explained participation propensity changes favoured males considerably, whilst unexplained changes were favoured them a lot less. The message is that, whatever it is that makes females observably worse participants than males (one must look at the participation

variables), they possessed a lot more of it in 1994 and they have had to pay a heavy price as a result.

Finally, changes in macroeconomic conditions captured by changes in the non-discriminatory wage structure (Row 7) have worked in favour of females between 1988 and 1994. This result accords with intuition as it suggests that the labour market has moved towards the type of employment and remuneration that suits females. Indeed the data shows that a large majority of the net employment gains between 1988 and 1994 went to females. Given the limited extent of female employment rate in Greece, this is a welcome result as it shows that macroeconomic changes are working in the right direction regarding participation and the wage gap.

V. Conclusion

This paper studied the link between labour market participation and wages in paid employment in Greece. It established the constituents of the male-female wage and participation gaps and found that the observed lower female relative pay can be primarily attributed to the factors which determine paid employment participation. The participation process was found to be highly discriminatory in favour of males, with females paying a large premium in terms of lower wages in order to be employed.

In the context of the fast changing socio-economic and legislative environment of Greece in the 1980s and the 1990s, with very low but rapidly increasing female labour supply, the paper established that the wage gap has been increasing primarily due to participation factors. Attempts to reduce the male-female wage gap in the 1980s through legislation on equal pay have been frustrated by considerable increases in female participation as well as family and maternity legislation which improved the non-pecuniary position of employed females in the labour market.

The main recommendation of this paper is that several costs which make the employment of females more expensive to the employer, should be pooled in order to put males and females on an equal footing in the labour market and reduce the incentive of employers to employ females only when they are willing to accept lower wages. A prime target should be the costs of maternity leave, which can have a serious impact in an economy with predominantly small size employers. As a *quid pro quo*, employers should be subjected

to more stringent regulations regarding female hirings in order to promote female employment in a non-discriminatory fashion.

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Appendix

Description of Variables:

CHBELOW6: Number of children in the household age 6 or less

CH613: Number of children in the household age 6-13

HEAD: Household head. (1 if yes, 0 otherwise)

MARRIED: (1 if married, 0 otherwise)

DIVORCED: (1 if divorced, 0 otherwise)

RENTEDHO: Rented house (1 if rented, 0 otherwise)

AGE24: Age between 17 and 24

AGE34: Age 25-34

AGE44: Age 35-44

SECHOME: Second home (1 if a second home at household's possession, 0 otherwise)

HHSIZE: Number of total household members

RETIRED: Number of retired household members.

Education dummies:

SECEDUC: Completed secondary education.(1 if yes, 0 otherwise)

HIGHED: Higher education graduate. (1 if yes, 0 otherwise)

Sectoral dummies:

TRANSP: Transportation and Communication. (1 if yes, 0 otherwise)

MANUF: Manufacturing. (1 if yes, 0 otherwise)

FINANCE: Banking and Finance. (1 if yes, 0 otherwise)

UTIL: Public Utilities. (1 if yes, 0 otherwise)

Urbanization variables:

URB: Resident of area with more than 10000 inhabitants

SEMIURB: Resident of area. with 2000-10000 inhabitants

RURAL: Resident of area with less than 2000 inhabitants

Descriptive Statistics

Table A1
Mean Values for Complete Sample

	1988			1994		
Variable	Pooled	Males	Females	Pooled	Males	Females
CHBELOW6	0.2493	0.2633	0.2372	0.2025	0.2153	0.1910
CH613	0.4545	0.4716	0.4398	0.4092	0.4226	0.3970
URB	0.4783	0.4664	0.4885	0.4720	0.4627	0.4803
SEMIURB	0.1555	0.1551	0.1559	0.1782	0.1776	0.1787
RURAL	0.1091	0.1109	0.1076	0.2090	0.2153	0.2033
HEAD	0.4002	0.7595	0.0921	0.3995	0.7334	0.0999
SECEDUC	0.3357	0.3500	0.3234	0.2784	0.2803	0.2768
HIGHED	0.1377	0.1730	0.1076	0.1538	0.1776	0.1323
MARRIED	0.7818	0.7643	0.7968	0.7754	0.7228	0.8225
DIVORCED	0.0181	0.0118	0.0235	0.0190	0.0118	0.0254
RENTEDHO	0.2398	0.2466	0.2340	0.2488	0.2587	0.2398
AGE24	0.1285	0.1133	0.1416	0.1069	0.1016	0.1116
AGE34	0.2658	0.2775	0.2558	0.2733	0.2707	0.2756
AGE44	0.2452	0.2525	0.2390	0.2777	0.2916	0.2651
SECHOME	0.1338	0.1346	0.1332	0.1081	0.1064	0.1099
HHSIZE	3.7320	3.8092	3.6657	3.6447	3.7007	3.5942
RETIRED	0.2765	0.2498	0.2994	0.2264	0.2027	0.2479
PARTICIPATION RATE	0.3305	0.4785	0.2035	0.3821	0.5015	0.2750
Cases	9946	4591	5355	9703	4584	5116

Table A2
Mean Values for Paid Employment Sample

	1988			1994		
Variable	Pooled	Males	Females	Pooled	Males	Females
SECEDUC	0.4013	0.3946	0.4147	0.3382	0.3203	0.3675
HIGHED	0.2364	0.2258	0.2578	0.2613	0.2343	0.3056
TRANSP	0.0891	0.1129	0.0413	0.0863	0.1160	0.0377
MANUF	0.2805	0.2845	0.2725	0.2031	0.2077	0.1955
FINANCE	0.0578	0.0510	0.0716	0.0396	0.0317	0.0526
UTIL	0.0198	0.0269	0.0055	0.0210	0.0300	0.0064
AGE24	0.1366	0.1129	0.1844	0.1090	0.0943	0.1329
AGE34	0.3328	0.3195	0.3596	0.3263	0.2990	0.3710
AGE44	0.2756	0.2772	0.2725	0.3180	0.3186	0.3170
MARRIED	0.7186	0.7674	0.6202	0.7082	0.7201	0.6887
DIVORCED	0.0253	0.0096	0.0569	0.0237	0.0087	0.0483
PUBLPRIV	0.4077	0.4074	0.4083	0.3932	0.3924	0.3945
MANAGER	0.0170	0.0232	0.0046	0.0547	0.0309	0.0938
λ	0.9272	0.7616	1.1737	0.8421	0.7232	0.9834
Log WAGE	10.5895	10.6697	10.4278	10.5224	10.6319	10.3434
SD of WAGES	0.4473	0.4441	0.4084	0.6436	0.5989	0.6736
Cases	3287	2197	1090	3708	2301	1407

Probit Results

Table A3
First-Stage Participation Probit Results 1988

	Pooled 1988		Males 1988		Females 1988	
Variable	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
CONSTANT	-1.5833	0.0754	-0.7564	0.1232	-1.3725	0.1203
CHBELOW6	-0.1102	0.0301	0.1170	0.0434	-0.1755	0.0471
CH613	-0.0591	0.0226	0.0937	0.0326	-0.0881	0.0354
URB	0.5369	0.0404	0.6136	0.0534	0.5680	0.0664
SEMIURB	0.4318	0.0480	0.5062	0.0638	0.4436	0.0774
RURAL	0.1215	0.0544	0.1020	0.0705	0.2201	0.0888
HEAD	0.8639	0.0323	0.0748	0.0913	0.0810	0.0873
SECEDUC	0.2602	0.0336	0.2027	0.0461	0.2777	0.0514
HIGHED	0.5683	0.0431	0.3235	0.0576	0.7752	0.0667
MARRIED	-0.3050	0.0434	0.0871	0.0839	-0.4898	0.0676
DIVORCED	-0.2374	0.1024	-0.3523	0.1854	0.2444	0.1281
RENTEDHO	0.1317	0.0339	0.1392	0.0480	0.2005	0.0491
AGE24	0.4696	0.0592	0.3100	0.0966	0.2697	0.0823
AGE34	0.5290	0.0446	0.2715	0.0655	0.5492	0.0680
AGE44	0.3546	0.0412	0.1244	0.0581	0.4931	0.0632
SECHOME	-0.0253	0.0414	0.0430	0.0575	-0.0967	0.0624
HHSIZE	0.0527	0.0135	-0.0500	0.0205	0.0008	0.0216
RETIRED	-0.0167	0.0296	0.0185	0.0413	-0.0522	0.0451
Log-Likelihood	-5383.99		-2927.339		-2293.965	
Restricted log likelihood	-6310.949		-3178.011		-2705.785	
Chi-Squared	1853.918		501.3427		823.6403	
Cases	9946		4591		5355	

Table A4

First-Stage Participation Probit Results 1994

	Pooled 1994		Males 1994		Females 1994	
Variable	Coefficie	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
CONSTANT	-1.7447	0.0719	-0.8309	0.1408	-1.7020	0.1066
CHBELOW6	-0.0685	0.0330	-0.0012	0.0463	-0.0673	0.0497
CH613	-0.0602	0.0234	0.0212	0.0335	-0.0748	0.0352
URB	0.6185	0.0488	0.7146	0.0641	0.5821	0.0790
SEMIURB	0.4193	0.0541	0.5280	0.0716	0.3520	0.0867
RURAL	0.1462	0.0525	0.1038	0.0677	0.2281	0.0856
HEAD	0.6997	0.0319	0.1289	0.0839	0.2143	0.0771
SECEDUC	0.3224	0.0337	0.2228	0.0471	0.4187	0.0499
HIGHED	0.7131	0.0411	0.3929	0.0563	1.0585	0.0613
MARRIED	-0.4038	0.0476	0.0305	0.0816	-0.5069	0.0716
DIVORCED	0.0694	0.1001	-0.5146	0.1839	0.5883	0.1284
RENTEDHO	0.2053	0.0333	0.2423	0.0472	0.2234	0.0483
AGE24	0.2297	0.0668	0.2210	0.1006	0.0897	0.0945
AGE34	0.3697	0.0467	0.2319	0.0689	0.3960	0.0674
AGE44	0.3364	0.0407	0.1696	0.0573	0.4807	0.0611
SECHOME	0.0133	0.0455	0.0005	0.0646	0.0229	0.0659
HHSIZE	0.0539	0.0134	-0.0088	0.0202	-0.0074	0.0209
RETIRED	-0.0450	0.0314	-0.0121	0.0447	-0.0584	0.0462
Log-Likelihood	-5503.67		-2912.76		-2465.07	
Restricted log likelihood	-6453.53		-3180.14		-3009.17	
Chi-Squared	1899.716		534.7487		1088.189	
Cases	9703		4588		5116	

OLS Results

Table A5
Second-Stage OLS Results 1988

	Pooled 1988		Males 1988		Females 1988	
Variable	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
CONSTANT	10.7140	0.0360	10.5530	0.0602	10.5100	0.0893
SECEDUC	0.1157	0.0166	0.1357	0.0209	0.1757	0.0314
HIGHED	0.1838	0.0215	0.2503	0.0273	0.2321	0.0464
TRANSP	0.1424	0.0234	0.1222	0.0266	0.1576	0.0525
MANUF	0.0267	0.0166	0.0300	0.0206	0.0386	0.0273
FINANCE	0.0665	0.0286	0.0821	0.0383	0.0729	0.0411
UTIL	0.1678	0.0469	0.1496	0.0509	0.1539	0.1388
AGE24	-0.4187	0.0265	-0.4220	0.0373	-0.3764	0.0397
AGE34	-0.2179	0.0186	-0.1750	0.0246	-0.2036	0.0380
AGE44	-0.0930	0.0182	-0.0382	0.0226	-0.1133	0.0371
MARRIED	0.1795	0.0182	0.1670	0.0262	0.1699	0.0356
DIVORCED	0.0420	0.0437	0.2450	0.0856	0.0254	0.0498
PUBLPRIV	0.1016	0.0156	0.0726	0.0193	0.1825	0.0258
MANAGER	0.3066	0.0510	0.3089	0.0556	0.1204	0.1511
LAMDA	-0.2841	0.0228	-0.1006	0.0438	-0.2098	0.0579
R-squared	0.3280		0.2881		0.3328	
Cases	3287		2197		1090	

Table A6
Second-Stage OLS Results 1994

	Pooled 1994		Males 1994		Females 1994	
Variable	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
CONSTANT	11.0260	0.0481	10.7980	0.0559	10.8080	0.1611
SECEDUC	0.0929	0.0239	0.1379	0.0275	0.1776	0.0525
HIGHED	0.0945	0.0302	0.2551	0.0334	0.0629	0.0832
TRANSP	0.1535	0.0330	0.1444	0.0339	0.0412	0.0841
MANUF	0.1226	0.0245	0.1168	0.0282	0.1593	0.0445
FINANCE	0.1739	0.0466	0.1427	0.0607	0.2130	0.0717
UTIL	0.2027	0.0638	0.1799	0.0633	0.0101	0.1997
AGE24	-0.6315	0.0401	-0.6859	0.0494	-0.4997	0.0674
AGE34	-0.2870	0.0270	-0.2542	0.0326	-0.2296	0.0536
AGE44	-0.1495	0.0249	-0.0916	0.0278	-0.1502	0.0552
MARRIED	0.2422	0.0258	0.2150	0.0307	0.2673	0.0563
DIVORCED	-0.1592	0.0594	-0.0330	0.1136	-0.1269	0.0903
PUBLPRIV	0.1821	0.0219	0.1259	0.0254	0.3027	0.0397
MANAGER	0.0656	0.0401	0.2212	0.0616	0.0071	0.0546
LAMDA	-0.4751	0.0357	-0.2034	0.0535	-0.4320	0.0921
R-squared	0.2873		0.3086		0.2398	
Cases	3708		2301		1407	

Qualitative results summed up

+++ (++,+) refer to a positive coefficient which is statistically significant at the 1% (5%, 10%) level. Negative signs refer to negative coefficients. Zeros refer to all coefficients with a t-ratio less than 1.64 irrespective of their sign.

1st Stage: Participation Estimation Results

	M88	M94	F88	F94	Comments
SECEDUC	**+++**	**+++**	**+++**	**+++**	Secondary education increases participation
HIGHED	**+++**	**+++**	**+++**	**+++**	Higher education increases participation
AGE24	**+++**	**++**	**+++**	**++**	Ages from 17 - 24 have higher participation than reference group (AGE>44)
AGE34	**+++**	**+++**	**+++**	**+++**	Ages from 25 – 34 have higher participation than reference group (AGE>44)
AGE44	**++**	**+++**	**+++**	**+++**	Ages from 35 – 44 have higher participation than reference group (AGE>44)
CHBELOW6	**+++**	**0**	**---**	**0**	Children below 6 in 1988 increase male participation and decrease female participation in 1988
CH613	**+++**	**+**	**--**	**--**	Children between 6-13 increase male participation and decrease female participation
HEAD	**0**	**0**	**0**	**+++**	Only female household heads have higher participation in 1994
MARRIED	**0**	**0**	**---**	**---**	Marriage has no effect on male propensity and a negative effect on female propensity
DIVORCED	**+**	**---**	**+**	**+++**	Divorced females have higher participation. Male result is unclear.
HHSIZE	**++**	**0**	**0**	**0**	Household size has not effect upon participation propensity with the exception of males in 1988 at 5% level of significance
RETIRED	**0**	**0**	**0**	**0**	The number of retired members in the household does not influence participation
RENTEDHO	**+++**	**+++**	**+++**	**+++**	Living in a rented house increases participation
SECHOME	**0**	**0**	**0**	**0**	The possession of second house does not influence participation
URB	**+++**	**+++**	**+++**	**+++**	Living in an urban area increases participation (reference category = remote areas)
SEMIURB	**+++**	**+++**	**+++**	**+++**	Living in semi urban areas increases participation (reference category = remote areas)
RURAL	**0**	**0**	**++**	**+++**	Living in rural areas increases female participation and leaves male participation unaffected

2nd Stage: OLS Estimation Results

	M88	M94	F88	F94	Comments
SECEDUC	+++	+++	+++	+++	Secondary education graduates earn higher weekly pay (reference group = lower education)
HIGHED	+++	+++	+++	0	Higher education increases pay with the exception of females in 1994 (reference group = lower education)
AGE24	---	---	---	---	Lower earnings than reference group: AGE>44
AGE34	---	---	---	---	Lower earnings than reference group: AGE>44
AGE44	-	---	---	---	Lower earnings than reference group: AGE>44
MARRIED	+++	+++	+++	+++	Marriage increases male and female pay
DIVORCED	+++	0	+	0	Divorce increases pay only in the 1988 cohort
TRANSP	+++	+++	+++	0	Working in transportation and communication increases pay with the exception of females in 1994
MANUF	0	+++	0	+++	The manufacturing sector pays females more in 1994.
FINANCE	0	++	+	+++	The financial sector pays more, especially females.
UTIL	+++	+++	0	0	Public utilities pay males more, but not females
PUBLPRIV	+++	+++	+++	+++	The broad public sector pays males and females more
MANAGER	+++	+++	0	0	Male managers are better paid, female managers are not.
λ	--	---	---	---	High participation propensity attracts better pay for both males and females.