SEX-DIFFERENCES IN JOB-ALLOCATION: WHAT DRIVES WOMEN'S INVESTMENTS IN THEIR JOBS?

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Abstract

This paper proposes a supply-side model of job-allocation under conditions of uncertainty and imperfect information. For each level of general human capital, the job-allocation decision is modeled as a discrete choice between two ideal job-types, one that requires job-specific skill-investments and one that does not. Individuals consider the tenure-reward profiles of each job-type and choose rationally on the basis of their expected job tenure. Expected job tenure is considered to be affected by individual-level characteristics, including preference heterogeneity, but also, and crucially, by macro-level distributions. Individuals are expected to make inferences about their own prospective tenure by looking at the existing distribution of certain relevant reference outcomes in their societies, this being a fundamental channel through which macro-level structures affect micro-level behavior. In particular, women's allocation choices are expected to be affected by the proportion of women already employed in highly-specialized jobs and by the proportion of housework-cooperative men living in their societies. Women are also expected to draw relevant information from their own mothers' employment experiences. The model is tested against data drawn from the second round of the European Social Survey (2004) using hierarchical modeling techniques. Results seem consistent with the model's expectations and suggest that both micro-level characteristics and macro-level distributions play a role in informing individual job-choices.

Keywords: Skills, gender, job-allocation, rationality, informational structure, macro-micro effects, European Social Survey.

1. Introducción*

Sex-differences in job-specific skills —i.e. skills that are acquired on the job— account for a significant part of the gender wage gap and, according to several estimations, could explain most of the statistical effect of occupational sex-composition on earnings (Tam 1997; 2000; Tomaskovic-Devey 2002; Polavieja 2008; *forthcoming*). Hence it is crucial for any theory of sex-differences in labor-market rewards to focus on the processes leading to sex-differences in job-skill acquisition. Why are women less likely to acquire job-specific skills leading to higher earnings?

The literature seeking to provide answers to this highly consequential question has been largely dominated by economic models. Economic models stress the role that women's employment intermittency plays in deterring investments in job-specific skills, both at the demand side of the labor market, via statistical discrimination (Arrow 1973; Phelps 1972), as well as at the supply side, via self-selection. Human capital, personnel economics and transaction-cost models argue that women's higher risks of job disruption act as a crucial deterrent of investments (see Polavieja 2008).

Sociological theories have added an emphasis on socialization and power. According to the so-called socio-cultural explanations, sex-differences in job-allocation and earnings are ultimately the product of socialization processes that transmit sex-specific values, orientations and stereotypes regarding men and women's roles in society. These values and stereotypes are carried over into the labor market hence producing sex-differences in both job-allocation and in the valuation of rewards (see, e.g., Crompton and Harris 1997, 1998; England *et al.* 1994, 2000; Polavieja 2008). It could be argued that socialization models entail a diffuse conception of power. In contrast, the so-called models of social closure stress the

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active role that more powerful actors (particularly male coworkers) play in excluding status inferiors (i.e. women) from the best and most desired jobs, which are those requiring specific training (Tomaskovic-Devey 1993; Tomaskovic-Devey and Skaggs 2002). Social closure is thus about the monopolization of privileged positions at the workplace, which is a micro-level manifestation of gender politics (Tilly 1998).

Socialization approaches advance our understanding of preference formation (see also Hakim 2000; 2003) and both socialization and social closure models offer critical insights on what often appears as economically "irrational" behavior both at the supply and the demand side of the labor market. These are undoubtedly important contributions. Yet sociologists' emphasis on socialization and social closure could be seen as somewhat peripheral to the question if women's higher risks of employment disruption are still the most important source of sex-differences in job-skill investments, as economic models argue. If this is indeed the case, then any theory of sex-differences in job-skill acquisition that does not recognize the centrality of disruption risks is meant to be only complementary to standard economic models. Sociological approaches to gender inequality have a lot to gain from focusing on job-disruption risks.

This paper draws on various theoretical contributions in both sociology and economics and proposes a supply-side model of job-allocation that recognizes the centrality of sex-differences in job-disruption risks. Agents have imperfect information about their probabilities of success in different jobs requiring different skill-investments but they act rationally within these limits. The job-allocation decision is therefore treated as an investment decision, which is driven by 1) the observed tenure-reward profiles of the different jobs and 2) the expected tenure in the job. Rational individuals will only choose to invest in specialized job-skills if they expect to spend a minimum time at the job. Prospective evaluations on expected tenure thus play a crucial role in this allocation model, as in standard human capital and contractual hazard approaches (see below). Individuals' assessments of their prospective tenure are then modeled as a function of individual-level characteristics, including preferences, but also of two crucial sources of information that are likely to influence the investment decision: 1) the societal distribution of household-cooperative men and job-investing women and 2) past family experiences. Introducing the structure of

information in the allocation decision constitutes the main theoretical contribution of this paper.

Hence rather than stressing the role played by socialization and social closure processes, this model emphasizes the social dimension of informational retrieving. It thus constitutes an innovative sociological contribution to the study of sex-differences in job-specialization. In a context of uncertainty and imperfect information, agents form beliefs about their own labor market prospects by looking at the experiences of their closest relevant informants as well as at the societal distribution of particular relevant outcomes. This process of informational retrieving provides a clear link between macro-level structures and micro-level behavior, as has been repeatedly called for by the defenders of analytical sociology (see, e.g., Coleman 1990; Hedström 2005; Hedström and Swedberg 2000), and could explain why the job-allocation choices of men and women might still differ even if they become identical in their assets and preferences.

This theoretical model is tested using data from the second round of the European Social Survey, ESS2, carried out in 2004 (Jowell and CCT 2005). The ESS2 includes a very exhaustive list of theoretically-relevant indicators pertaining to the attitudinal, the domestic and the occupational spheres. Very few cross-national surveys are as complete in all three realms.

The paper is organized as follows. In the first section the theoretical model is presented. The second section describes the main variables and discusses the methodology and specification used in the empirical analysis. Then the main empirical results are presented. Finally, the study concludes with a summary and discussion of the main findings.

2. The model

Individuals consider the expected returns of their job-matching decisions by looking at the tenure-earning profiles of the different types of jobs available to them. Jobs matter both

because of the specific investment requirements they entail and the contractual hazard problems they give rise to. These two dimensions are related.

Standard human capital theory has focused on the skill-dimension of jobs[1] (see in particular Becker 1993[1964] and Polachek 1981), whilst personnel economics,[2] transaction cost and efficiency wage theories,[3] and rational action theories of the employment contract[4] have all dealt with contractual-hazard. The differences between human capital and contractual-hazard approaches have been stressed elsewhere (Polavieja 2005), yet for the purposes of this argument it seems best to focus on commonalities.

All types of training that occurs on the job, including training on skills that have an economic value outside the firm, can be conceived as entailing costs and benefits for both employees and employers. This would explain why, contradicting the predictions of standard human capital theory, employers are very often willing to bear with the costs of training in transferable skills (see, e.g., Acemoglu and Pischke 1998; Kessler and Lülfesmann 2006; Loewenstein and Spletzer 1998). Moreover, it could be argued that the distinction between transferable and firm-specific skills that is so central to Becker's original formulation (see Becker 1993[1964]: 33-49) is in fact hard to make in practice (Acemoglu and Pischke 1998). As such, neither the employer nor the employee will be able to assess easily the degree of skill-transferability of any given training scheme (including informal learning on the job), whilst both parties will recognize without difficulty the extent to which skill investments (of whichever type) have been made. Under this light, all types of job-skill investments can be seen as a source of contractual hazard.

[1] Polachek (1981) introduces job-allocation decisions within the general human capital framework. Yet human capital approaches have been generally criticized for subsuming the characteristics of jobs under the characteristics of individuals. For an early sociological critique along these lines see Granovetter (1981). See also Lazear (1995: 77-79) for a critique from personnel-economics. A further criticism of human capital approaches in the context of wage decomposition methods can be found in Polavieja (2005).

[2] See, e.g.: Lazear (1995); Lazear and Rosen (1990); Milgrom and Roberts (1992).

[3] See, e.g.: Akerloff and Yellen (1986); Goldin (1990); Shapiro and Stigliz (1984); Stiglitz (1975); Williamson (1985: 240-72), Williamson, Wachter and Harris (1975).

[4] See: Breen (1997); Goldthorpe (2000: ch. 10); Polavieja (2003); Sorensen (2000).

Employers' investments in job skills generate incentives for closing the employment relationship to outside competition. This is typically achieved via long-term, open-ended contracts, which are used by employers as a means to safeguard their investments in workers' job-specific training. Yet closing the employment relation increases employees' opportunities for shirking. Employers thus face the problem of how to safeguard their skill-investments, whilst at the same time ensuring that workers' put forth productive effort (for a discussion see, e.g., Sorensen 1994). A typical way of dealing with the disincentive consequences of employment closure is the use of steep tenure-earning profiles where compensation increases with tenure on the job (see, e.g., Breen 1997; Goldthorpe 2000: 206-29; Sorensen 2000). Steep tenure-earning profiles shift the returns to job-specific skill investments to the end of the employment career and this makes job-separations increasingly costly for the employee.[5] Deferred compensation therefore acts as an incentive device that promotes both employees' durability in the firm and their sustained effort over time.[6]

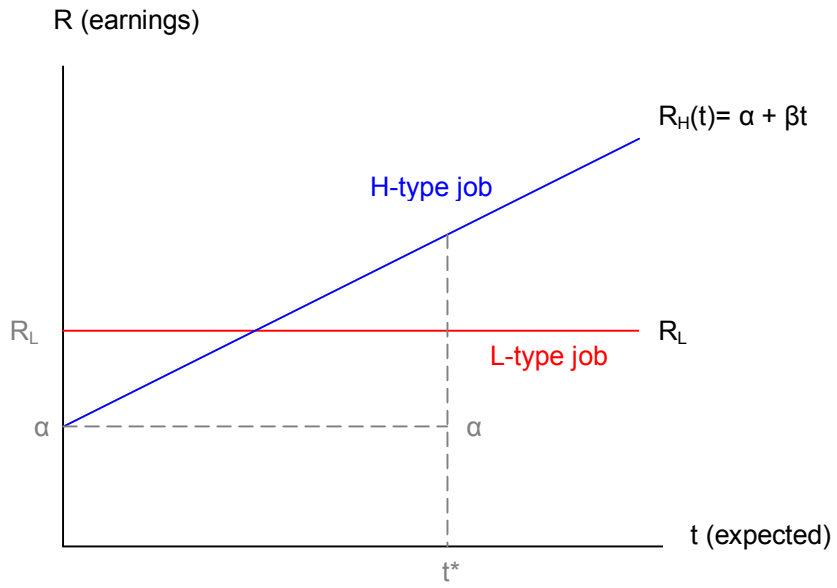
Moreover, employers will best safeguard their skill-investments if they manage to reduce wages during the training period as a means to avoid early quits. Reducing earnings at the early stages of the employment relationship whilst deferring compensation to the end seems an optimal managerial strategy because it generates incentives for workers to invest in job-specialization as well as to stay in the firm after such investments have taken place. If totally successful, this compensation scheme would imply below-productivity wages at early stages (when most training takes place) and above-productivity wages (i.e. rents) at the end (see Lazear 1995: 239-42).

[5] Closure might, however, follow from workers' collective action or even from high levels of institutional regulation imposed directly by governments in non-unionized contexts. Yet, regardless of its source, closure is likely to generate the same type of incentive problems (Polavieja 2003).

[6] Steep tenure-earning profiles would also follow even if we assumed that skill transferability is perfectly observable, as does the standard human capital theory, and even in the case of perfectly transferable skills. According to Becker (1993[1964]: 30-50), investments in skills that have an economic value outside the firm should be borne by employees themselves. This is typically achieved by reducing employees' wages during their training period. If employers succeed in shifting all the training costs to employees, the employment relationship would not need to be closed. Yet training will eventually pay off via higher productivity as workers accumulate tenure. Hence, the human capital model also expects wage gains over tenure in the case of job-skills that are transferable to other firms.

For simplicity, let us assume that there are only two types of jobs in the economy: jobs that require no (or very low) skill investments (L) and jobs that require high skill investments (H). In the former type, individuals are employed to use their general pre-market skills acquired through schooling, whilst in the latter type employees are trained to learn new skills that are specific to the job (although not necessarily to the firm). Training in H-type jobs can be formal or informal. The expected returns over tenure for these two types of jobs are represented graphically in figure 1.

Figure 1. Compensation profiles over tenure for high-specialization (H) and low-specialization (L) jobs



2.1. The job-matching decision

Individual *i* will choose job H over job L if his/her expected returns in job H (R_H) are greater than his/her expected returns in job L (R_L). Individuals calculate expected returns on the basis of the observed tenure-earnings profiles of each type of job and their expected tenure (t). For ease of exposition, we assume that returns over tenure in L jobs are 0, whilst

returns over tenure in job H increase at a constant rate (β). Formally, individual *i* will choose job H if:

$$t \cdot R_L < t \cdot \alpha + \tfrac{1}{2}\beta t^2 \qquad [1]$$

where each side of expression [1] is the reward profile of each type of job as defined by the areas shown in figure 1.[7] It is now easy to demonstrate that rational individuals will only choose job H if their expected tenure (t) exceeds value t*, as in any value below t* returns over tenure will be greater in job L. Formally, individuals will choose H over L if t>t*, where:[8]

$$t^* = 2(R_L - \alpha)/\beta \qquad [2]$$

Expected tenure (t) is thus crucial for the job-matching decision, which is here defined as a skill-investment decision. It is widely known that average tenure for men is significantly longer than for women, as men very seldom interrupt their careers for family-related reasons, whilst women typically do. Hence it should come as no surprise that men are more likely to invest in job-specific skills, the returns of which depend on tenure. Yet it is also obvious that not all women are equally likely to interrupt employment and hence variation in women's assessments of their prospective tenure should be expected. Understanding the sources of such variation seems crucial for any explanation of sex-differences in job-specific skills.

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[7] Note that $\tfrac{1}{2}\beta t^2 = [(\alpha + \beta t - \alpha) \cdot t] / 2$

[8] Expression [2] follows from:

$0 < t(\alpha - R_L) + \tfrac{1}{2}\beta t^2$

$0 < (\alpha - R_L) + \tfrac{1}{2}\beta t$

$R_L - \alpha < \tfrac{1}{2}\beta t$

$t > 2(R_L - \alpha)/\beta$

2.2. Sources of variation in women's expected tenure

Actors operate in a very complex and uncertain context. They have the intention of being rational, but they are cognitively restricted because their capability of retrieving, storing and processing information is limited in reality (Simon 1983 in Goldthorpe 2000: 119). Intentionally-rational individuals have to draw on the imperfect information available to them to form expectations about the costs and benefits of their different courses of action. In this particular context, women's assessment of their prospective tenure becomes a crucial element influencing their job-investment decisions. How do women asses their prospective tenure in different jobs?

Women's expected tenure (t^w) will depend, first of all, on their own individual characteristics. Two such characteristics seem crucial: 1) their previous investments in human capital (i.e. schooling) and 2) their own tastes and preference regarding the career-family trade-off. Schooling matters to the extent that general pre-market skills and job-specific skills are correlated —i.e. to the extent that H-type jobs are more likely to demand people with greater levels of general human capital. Preferences and tastes, on the other hand, will have an obvious impact on expected tenure since family-oriented women will be much more willing to interrupt their careers for family-related reasons than career-oriented ones. Variation in preferences and tastes amongst women has been widely documented and so have been the labor market effects of such variation (see, e.g., Bowles *et al.* 2001; Crompton and Harris 1997; 1998; Hakim 1996; 2000). Individual-level variation in schooling and tastes is therefore expected to have a clear impact on job choices. Yet job choices will also depend on women's evaluation of the risks involved in opting for each of the two possible courses of action, for which information is needed.[9]

A central tenet of all mechanism-based explanations in sociology is that macro-level distributions affect individuals' belief formation (Hedström and Swedberg 1998: 19-21). Several mechanisms can account for this macro-to-micro effect, yet it is the informational dimension of macro-level distributions that concerns us here. In a context of uncertainty and

[9] Although it can be argued that schooling affects individuals' capacity to retrieve and process information, differences in family and work orientations should have no bearing on information processing.

imperfect information, intentionally-rational individuals are likely to draw on the societal distribution of a particular outcome of interest (in a given reference group) to inform their own probabilities of success/failure in undertaking a particular course of action for which such outcome of interest is consequential. This specific form of gathering information has been called *distributional inference* (Polavieja *forthcoming*). Distributional inference constitutes a fundamental channel through which macro-level structures affect micro-level behavior.

It seems reasonable to expect that, in assessing their expected tenure in the job (and hence in making their allocation choices), women will consider the existing societal distribution of two highly-consequential reference outcomes, namely: 1) the proportion of women already employed in high-skilled jobs (H^w) and 2) the proportion of housework-cooperating men (C^m) in their societies.

The former provides women with inferred information about their own probabilities of success/failure, should they opt for H-type jobs. The more women make it into type-H job the lower the perceived risks of failure for female job-candidates will be. The macro-level distribution of women between H and L-type jobs will thus be interpreted as relevant proxy information in a context where accurate information about the actual probabilities of each individual worker cannot be assessed *ex-ante*.

Similarly, the distribution of cooperative men (i.e. men willing to share domestic responsibilities equally with their spouses) present in women's societies should be a very relevant piece of information when it comes to assessing expected tenure. This is because having to attend family-related matters is the most important reason for job disruptions amongst women and hence any information on the likelihood of sharing such obligations is meant to play a role in women's assessments. *Ceteris paribus*, women living in gender-cooperative environments will tend to expect longer tenure because they will be comparatively more able to count on their (potential) spouses for dealing with family and household tasks.[10]

[10] Here the model connects with Breen and Cooke's (2005) recent game-theoretic analysis of the division of domestic labor.

2.3. The family as a source of information

In principle, married and cohabiting women could draw the most relevant information on their individual expected tenure from their own spouses' household behavior. Yet it must be noted that spouses' behavior cannot be treated as an exogenous variable to skill-investment choices since women could choose their partners having in mind the type of job that they will look for. In contrast, the societal distribution of cooperative men can be treated as an exogenous variable that is informative for all women, including those without partner. Note also that such distribution also conveys relevant information for women who are currently married to (or cohabiting with) uncooperative spouses, since it signals their chances of finding new cooperative partners should their actual partnership arrangements dissolve (Breen and Cooke 2005).

Women could also retrieve relevant information from their own parents and, in particular, from their mothers. Again, it is assumed that, regardless of other possible effects, having a mother who invested in H-type jobs increases the likelihood that women chose such option simply because it conveys clear information about its feasibility (Breen and García-Peñalosa 2002). Clearly, this "maternal" effect can operate through various other channels apart from informational conveyance, particularly those involved in the standard processes of intergenerational transmission of social advantage. Note, however, that the bulk of such standard effects of mothers' employment on off-springs' job choices should probably be captured by respondents' own levels of education and partially also by their own tastes and preferences. If mothers' experiences as employees also act as a relevant source of information for their daughters, then we should expect this mother-daughter association to hold even after controlling for all other possible indicators of inheritance effects.

In sum, prospective tenure plays a central role in this job-choice model as women expecting job tenures below the theoretical value of t* will rationally opt for L-type jobs. Women's expected tenure (t^{w}) has been here defined as a function of schooling levels (S_i), individual preferences regarding work and family (P_i), the societal distribution of women in H-type jobs (H_{ir}^{W}) —where the r subscript stands for the societal unit from which *i* draws distributional inferences—, the societal distribution of cooperative men (C_{ir}^{M}), and what

could be term a "maternal informational effect" (M_i), here defined as the probability that respondents' mothers have themselves invested in H-type jobs in the past. Hence:

$$t_i^{w}=f(S_i, P_i, H_{ir}^{W}, C_{ir}^{M}, M_i) \qquad [3]$$

Expected tenure is a conceptual device and hence unobservable. But the preceding discussion sheds light on several plausible mechanisms affecting job-choices which can be subjected to empirical test. It is now possible to define the probability of opting job H over L ($P_{H/L}$) as:

$$P_{H/L}=f(sex_{ij} + S_{ij} + P_{ij} + sex_{ij} \cdot H_{ijr}^{W} + sex_{ij} \cdot C_{ijr}^{M} + sex_{ij} \cdot M_{ij} + X_{ijk}) \quad i= 1,.., N \quad r=1,.., R \quad j=1,.., J \quad k= 1,.., K \qquad [4]$$

where *i* is the individual subscript, *j* represents the number of the highest macro-level units individuals are clustered in (J), which in the empirical specification below will be countries, *r* is the number of macro-level units individuals draw their relevant information from, which in the empirical specification below is assumed to be their region of residence (R), and X is a vector of *k* control variables, which will be described in the next section.

Note that in expression [4] respondents' sex is interacted with the two macro-level distributional variables as it follows from the above discussion on distributional inference that both the proportion of women employed in H-type jobs and the proportion of cooperative men present in respondent's societies of reference (*r*) should convey relevant information for women but not for men. Similarly, whether the mother of the individual *i* has held an H-type job or not should only have informational consequences in the case that respondent *i* is a woman and that is why expression [4] also includes an interaction between mother's employment and individual's job-choices. To be sure, mother's employment is expected to have also a significant effect for men but this effect will reflect only social-inheritance mechanisms and not relevant information as it is the case for women. In other words, it is

expected that the effect of M will be greater for women than for men, controlling for other possible sources of parental influence.

3. Data, variables and model specification

The data used to test this model comes from the *Family, Work and Wellbeing* module included in the second round of the European Social Survey, ESS2 (2004). The working sample includes all currently-employed married or cohabiting wage-earners that are country nationals from Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Luxemburg, Norway, Poland, Portugal, Spain, Sweden, Slovenia, Switzerland and the United Kingdom (N=16,255). These are the countries included in the first-released data-files of the ESS2 (2004), to which this section draws.

In the theoretical section of the paper, job-allocation decisions have been defined as skill-investment decisions over a discrete choice between two ideal types of jobs. Yet in practice the skill-content of a particular job includes several dimensions that can be more accurately described and measured using continuous indicators. The ESS2 includes the following four indicators on the skill-content of jobs: 1) the (self-assessed) time required to learn to do respondents' jobs well for someone with the right qualification;[11] 2) whether respondents have attended a job-skill training course in the last 12 months; 3) degree of agreement with the sentence "my job requires that I keep learning new things;"[12] and 4) (self-assessed) evaluation of the number of years of post-compulsory education that would be optimal for performing respondent's job. Maximum-likelihood factor analysis can reduce these four indicators to a single and continuous job-skill factor (see table a1 and figure a1 in Appendix). This job-skill factor (JSF) is used as the dependent variable in our empirical analysis. The actual form of the regression models fitted to the ESS2 is explained below.

[11] This is measured using an interval scale that ranges from 1 (*less than a week*) to 8 (*more than 2 years*).

[12] This is measured using a 4-interval Likert scale ranging from 1 (*not at all true*) to 4 (*very true*).

These regressions can be interpreted as modeling a latent continuous variable that underlies the discrete decision presented in the theoretical section of this paper (Long 1997: 40-7).

Individual-level variables of interests are schooling (S) and subjective preferences (or tastes) regarding career and family orientations (P). Schooling is measured as years in education, whilst subjective preferences are captured drawing on the wealth of attitudinal indicators present at the ESS2. Two different scales have been constructed that allow us to identify attitudinal differences in career and family orientations and hence to control for a source of individual heterogeneity that is usually unobservable in most existing research.

The first scale (P1) measures gender attitudes and has already been used in Polavieja (2008; *forthcoming*). The scale computes respondents' degree of agreement with the following 5 Likert-type items: 1. whether *women should be prepared to cut down on their wages for the sake of their families,* 2. whether *men should have equal domestic responsibilities as women*, 3. whether *men should have preference over scarce jobs*, 4. whether *parents should stick together for children even if they do not get along*, and 5. whether a *person's family should be his/her priority*. The scale shows a Cronbach's alpha of 0.6, it is normally distributed and ranges from 0 to 20, the latter value implying the highest score in "traditional" gender attitudes.

The second attitudinal control (P2) is the result of applying factor analysis to a set of attitudinal questions from the so-called *Human Value* module of the ESS2. In this module, respondents are presented with several descriptions of fictitious individuals and are asked to evaluate how much alike they consider themselves to be in relation to the examples described (examples are chosen so as to have the same sex as respondents). Factor analysis showed that responses to the following descriptions did actually formed part of a single factor (results available on request): 1. *Being very successful is important to her/him. She/he hopes people will recognize her/his achievements*; 2. *It is important to her/him to show her/his abilities. S/he wants people to admire what s/he does*; and 3. *It is important to her/him to get respect from others. S/he wants people to do what s/he says*. Responses to these three descriptions were added up in a 6-interval scale ranging from -3 to 2. The scale showed a Cronbach's

alpha of 0.7. This scale can be interpreted as measuring respondents' taste for social success[13] —i.e their degree of social ambition. Previous research has shown that the ambition scale has a positive and significant impact on individual earnings (Polavieja *forthcoming*). It seems reasonable to expect that social ambition thus defined also exerts an influence on skill-investment decisions. Estimating the effect of the social ambition scale offers an unusual opportunity to control for individual characteristics that are very seldom observed.

Distributional indicators are measured at the regional level using the ESS2 data as the basis for calculation. There are 165 regions in the working sample. It has been assumed that women draw relevant information from the difference in percentage points between the proportion of women and the proportion of men that are employed in highly-skilled jobs in their region of residence (H^W), as this difference should capture the degree of social visibility of women in H-type jobs. In order to maximize the number of observations per regional cell[14], highly-skilled jobs have been defined as all those occupations included in class I of the Goldthorpe schema —i.e. high-skilled professionals, managers and directors— (Goldthorpe 2000: chap.10). This occupational definition is highly consistent with the reliability tests performed to the job-skill factor (see figures a2 and a3 in Appendix).

The second macro-level indicator that is expected to convey relevant information for women's investment choices is the proportion of cooperative male in respondent's region (C^M). As a signal of male degree of cooperativeness we have used the proportion of men without tertiary education in respondent's region of residence who (claim to) do half or more of the weekly housework (see figure a4 in Appendix). Focusing on men without tertiary education increases regional variance and it is perhaps more informative as a signal, since it is known that highly-educated men are on average more cooperative (see, e.g., Bianchi *et al*. 2000: 210).

[13] All the indicators that form this scale are part of what Schwartz (2006) identifies as "mastery cultures". Yet I favor an interpretation of the scale as capturing individuals' heterogeneity in values, orientations and traits possibly leading to differences in skill-investment choices amongst individuals of any given national/cultural context.

[14] Using direct information for job-skills to compute regional sex-distributions would force us to work only with the *Work, Family and Wellbeing* module of the ESS2, which is restricted to married and cohabiting respondents, hence reducing the number of observations in each region.

Table 1. Description of key variables. Respondents in Paid Work. ESS2 (2004)

Variable	Description	N	Mean or %	Standard deviation
Skill-Job Factor	Scores of Maximum-Likelihood Factor Analysis on several indicators of the skill-content of respondent's job	13,202	0.006	0.842
Sex	Sex of employed respondents	16,556		
	Male	8,938	54.0%	
	Female	7,618	46.0%	
Age		16,506	42.2	11.5
Schooling	Years of schooling completed	16,449	12.8	3.7
Ambition Index	Index of social ambition. It is a 6-interval scale ranging from -3=less ambitious to 3=more ambitious	16,574	-0.22	0.83
Sex-role attitudes (familialism)	Index of (traditional) gender role attitudes. 21-interval scale ranging from 0=less traditional to 20=more traditional	16,574	8.87	3.03
Mother Professional when R 14	Respondent's mother had a professional occupation when respondent was 14			
	No	14,446	87.2%	
	Yes	2,128	12.8%	
P Cooperative Men in Region	P of men with lower than tertiary education(1) who do half or more of the household in respondent's region of residence	16,574	0.052	0.038
Regional Gender-Gap in Prof.	(Proportion of professionals amongst employed men in respondent's region) – (Proportion of professionals amongst employed women in respondent's region)	16,574	0.074	0.069
Industry-Region Skill Demand	Average score in skill-job factor in respondents' industry at respondent's region of residence	16,360	-0.04	0.55
Industry-Region Unemployment	Average rate of unemployment in respondents' industry at respondent's region of residence	16,574	0.08	0.10

Notes: (1) Except for the UK, where cooperative men refer to all educational levels since the ESS2 UK-sample does not allow detailed educational level distinctions.
Source: European Social Survey, Second Round, First-Available Countries (2004).

Other macro-level controls used in the empirical models are the average skill-job factor score in respondents' industry at respondent's region of residence, which is interpreted as an

indicator of the demand for job-specific skills, and the average rate of unemployment in respondents' industry at respondent's region of residence, which measures general economic conditions. These controls seek to net out the informational effect expected from the representation of professional women in the region from other possibly correlated economic influences at the demand side. They seem necessary demand-side controls to the extent that the proportion of skilled-jobs available should itself exert an influence on skill-investment choices.

The model also introduces a dummy variable, which has a value 1 if the mother was employed as a professional (classes I or II of the Goldthorpe schema) when the respondent was 14 and 0 otherwise[15] (see figure a5 in Appendix). This is admittedly a rather crude estimation of mothers' skill investments yet it is the only one available at the ESS2. In order to isolate the informational component of the overall mother effect, we also control for father's level of education when the respondent was 14, which should absorb the effect of social-inheritance that is not captured by respondent's own education and preferences. Other individual-level controls are respondents' age, marital status, size of the firm, firm's activity and union membership.

3.1. Specification

Skill-investments in jobs are analyzed using a simple two-level hierarchical linear model that allows us to estimate net effects at the individual level whilst controlling for country-level variation in average job-skills. Our preferred specification is the so-called random-intercept model where intercepts are allowed to vary randomly between the highest second-level units (i.e. countries[16]). It has been assumed that individuals draw information from the distributions of relevant outcomes at their region of residence. This seems a reasonable assumption to make and has the advantage of maximizing individual variance. In

[15] Class II has been included in the definition as there are very few respondent's whose mothers where high professionals, managers and directors.

[16] In order to increase between-group variance former-East and former-West Germany as well as Flanders and the rest of Belgium are treated separately and this yields 19 level-two observations.

our preferred specification, regions are not treated as second-level units but only as the domain of individual's distributional inferences. Hence the regional distribution of relevant outcomes is measured as individual-level variation. This is mainly for technical reasons as there are several regional units containing few individuals. The empirical model can therefore be expressed as follows:

$$JSF_{ij} = \beta_{0j} + \beta_1 sex_{ij} + \beta_2 S_{ij} + \beta_3 P1_{ij} + \beta_4 P2_{ij} + \beta_5 (sex_{ij} \cdot H_{ij}^{W}) + \beta_6 (sex_{ij} \cdot C_{ij}^{M}) + \beta_7 (sex_{ij} \cdot M_{ij}) + \beta_k X_{kij} + e_{0ij} \quad [5]$$

where β_{0j} equals the average intercept (γ_{00}) plus between-country variation (u_{0j}):

$$\beta_{0j} = \gamma_{00} + u_{0j},\ u_{oj} \sim N(0,\sigma_u^2),\ e_{0ij} \sim N(0,\sigma_e^2) \quad [6]$$

Following Snijders and Bosker (1999:41), the constant regression coefficient β_{0j} is now denoted γ_{00} to indicate that it is a parameter in the overall model. Substitution yields:

$$JSF_{ij} = \gamma_{00} + \gamma_{01} sex_{ij} + \gamma_{02} S_{ij} + \gamma_{03} P1_{ij} + \gamma_{04} P2_{ij} + \gamma_{05} (sex_{ij} \cdot H_{ij}^{W}) + \gamma_{07} (sex_{ij} \cdot M_{ij}) + \gamma_{0k} X_{kij} + u_{0j} + e_{0ij} \quad [7]$$

u_{0j} can be estimated either as a fixed or as a random coefficient, this being a rather contentious issue in the specialized literature (Halaby 2004). In our data we have 19 level-two units containing an average of 600 level-one observations each. These sample sizes seem to favor random-intercept models over fixed-effects. Random-intercept models assume a normal distribution of level-two effects. They seem to be more fitting when level-two units can be regarded as a sample of a hypothetical population of societies, which can be argued to be the case (Snijders and Bosker 1999). The estimation method used is maximum likelihood. Findings are, however, robust to several other specifications including using regions as level-two units or estimating fixed-effects. The estimates obtained using different specifications are compared in the Appendix (see table a2). They are almost identical.

4. Findings

The results of fitting a random-intercept estimation of equation [7] above to the ESS2 data are shown in the first two columns of table 2. The first column presents the parameter coefficients for a model where the reference category of the sex dummy is being a woman. The second column presents the estimated coefficients for all main-effect terms using the alternative coding of sex, that is, when the reference category is coded as being a man. This presentation allows a full interpretation of all the interactions. For instance, a sex-schooling interaction has been found that was not part of the theoretical discussion and hence constitutes a deviation from expression [7]. This interaction suggests that schooling has a significantly larger effect for women's skill investments than for men's. The estimated coefficient for women is 0.086, whilst for men is 0.018 less, that is, 0.068. This latter estimate for men together with its significance level is presented in the second column of the table. The schooling-sex interaction is an interesting finding but does not seem detrimental to our theory. In fact all the results obtained seem fully in line with the model predictions.

First, we observe, as expected, that men score higher on the job-skill factor even after controlling for individual and distributional variables. Secondly, we observe that both the sex-role attitudinal scale, which can be interpreted as tapping on respondents' pro-family orientations, as well as the so-called social ambition index, which measures respondents taste for social success, are significantly correlated with the degree of job-specific skills. Pro-family attitudes seem to reduce job-skill investments, whilst social ambition increases them and this for men and women alike —sex-interaction effects have been tested and rejected. But perhaps most importantly, findings are consistent with the existence of both distributional inference and maternal informational effects.

As expected, both the degree of visibility of professional women in respondents' region of residence and the proportion of cooperative men seem to exert a positive and significant influence on women's skill investments. Yet —also as expected— they have no significant impact at all for men. These findings are fully in line with the idea that women draw on macro-level distributions of relevant outcomes to inform their own skill-investment choices. In regions where women are underrepresented in jobs requiring high job-skill investments

and where there are few cooperative men to draw on, women are more likely to choose jobs with lower skill requirements. These findings hold even after controlling for women's individual characteristics, including schooling, age and preference heterogeneity, as well as for the region-industry skill-demand and the region-industry level of unemployment. They are also robust to alternative specifications including using fixed-effect and treating regions as level-two units (see table a2 in Appendix). I therefore interpret these findings as evidence of macro-level informational effects.

Further evidence consistent with this informational process are the findings that having a mother who was employed as a professional when the respondent was 14 increases individuals' job-skill factor scores and that this effect is significantly larger for women. The estimates of this "maternal" effect are net of respondents' own education and preferences and also of the father's educational level. Admittedly, this interaction could be capturing other possible mechanisms apart from informational processes that cannot be properly controlled for, the most likely of which could be personal networks. Unfortunately, network effects cannot be estimated using ESS2 data. Without ruling out the possibility of other causal effects, the idea that mothers' employment experiences can be a crucial source of information guiding daughters' skill-investment decisions seems, however, most plausible. This idea has been theorized as Bayesian learning in the economic literature (Breen and García-Peñalosa 2002).

Table 2. Random-Intercept Regressions on Job-Skill Factor, ESS2 (2004)

	PREFERRED MODEL		*+ ENDOGENOUS VARIABLES*	
	Sex coded female = ref.	*Sex coded male = ref.*	*Sex coded female = ref.*	*Sex coded male= ref.*
Input variables	b Sig.	b Sig.	b Sig.	b Sig.
Sex	0.448****		0.363****	
	(0.047)		(0.049)	
Age	0.019****		0.020****	
	(0.004)		(0.004)	
Age^2	0.0002****		-0.0002****	
	(0.00004)		(0.00004)	
Years of Schooling	0.086****	0.068****	0.085****	0.069****
	(0.003)		(0.003)	
Years of Schooling*Sex	-0.018****		-0.017****	
	(0.003)		(0.003)	
Ambition Index	0.092****		0.091****	
	(0.007)		(0.007)	
Sex-role attitudes (familialism)	-0.017****		-0.017****	
	(0.002)		(0.002)	
Regional Gender-Gap in Professionals	-0.237*	0.14 n.s.	-0.259**	0.16 n.s.
	(0.131)		(0.131)	
Reg. Gender Gap in Professionals*Sex	0.377**		0.414**	
	(0.162)		(0.162)	
P Cooperative Men in Region	0.531**	-0.32 n.s.	0.513**	-0.26 n.s.
	(0.229)		(0.229)	
P Cooperative Men in Region*Sex	-0.860***		-0.776***	
	(0.298)		(0.298)	
Mother Professional when R was 14	0.135****	0.07***	0.129****	0.07***
	(0.024)		(0.024)	
Mother Professional*Sex	-0.065**		-0.057*	
	(0.034)		(0.034)	
Industry-Region Skill Demand	0.631****		0.630****	
	(0.016)		(0.016)	
Industry-Region Unemployment Level	-0.115*		-0.102*	
	(0.063)		(0.063)	
Housework Supply			-0.020****	
			(0.004)	
Dependent Children			-0.035**	0.05***
			(0.018)	
Dependent Children*Sex			0.087***	
			(0.023)	
constant	-1.916****		-1.861***	
	(0.094)		(0.097)	
N of observations =	*12,567*		*12,567*	
N of groups =	*19*		*19*	
Log likelihood =	*-11903.884*		*-11883.399*	
sigma_u	*0.103****		*0.104****	
	(0.018)		*(0.018)*	
sigma_e	*0.622****		*0.621****	
	(0.004)		*(0.004)*	
Likelihood-ratio test of sigma_u=0	*213.52****		*214.86****	

Notes: All models control for marital status, size of the firm, firm's activity, unionization*sex and father's educational level when respondent was 14.
**** significance ≤ 0.001; *** significance ≤ 0.01; ** significance ≤ 0.05; * significance ≤ 0.1.
Source: Calculated by the author from European Social Survey, Second Round, First-Available Countries (2004).

The last two columns of table 2 present the results of introducing two further variables to the previous model: respondents' supply of housework[17] and parental status. Housework reduces job-skill scores for both men and women alike —an interaction effect has been tested and rejected—, whilst having children is negatively associated with women's job skill investments but positively associated with men's. Yet it must be noted that these are highly endogenous variables as women might choose particular spouses having in mind a particular job choice and/or they might choose particular jobs on the basis of their previously-taken fertility decisions. Endogeneity precludes any clear interpretation in terms of causal effects and hence the first specification is preferred.

5. Conclusions

Differences in job-specific skills can account for a substantial part of the gender wage-gap. Hence it is crucial to understand the determinants of such differences. This paper has presented a theoretical model that treats supply-side allocation decisions as investment choices on different tenure-earnings profiles. Jobs that require high-skill investments show steep returns to tenure but offer comparatively lower returns at the early stages. For simplicity, it has been assumed the standard human capital argument according to which earnings should be lower during the training period in jobs requiring high skill-investments. Yet it must be noted that even if nominal wages are not lower at low values of tenure in jobs requiring high skill investments, wages per effort should, since it is obvious that training requires effort (Polavieja *forthcoming*). Hence the existence of lower nominal wages during training in high-skilled jobs is not essential for the model, although it simplifies it. Different

[17] Individual housework supply is measured using information on the total amount of housework time supplied at respondents' homes, as well as on respondents' own contribution to this total. The ESS2 defines total housework as the number of hours devoted in a typical weekday by all members of the household to domestic tasks such as cooking, washing, cleaning, shopping, property maintenance and the like, not including childcare nor leisure activities. Respondent's own share of this total has been computed on the basis of their responses to the ESS2 question "*about how much of this* (total household) *time do you spend yourself?*" assuming the following equivalences (imputed values in parenthesis): 1. *None or almost none* (0); 2. *Up to a quarter of the time* (0.2); 3. *More than a quarter, up to a half of the time* (0.4); 4. *More than a half, up to three quarters of the time* (0.6); 5. *More than three quarters, less than all of the time* (0.8); and 6. *All or nearly all of the time* (1). Total individual housework is calculated as total household housework multiplied by respondent's share (using the imputed equivalences).

tenure-earning profiles (or different tenure-earning/effort profiles) imply that, for each level of schooling, the decision to invest in job-specific skills will be a function of expected tenure. Women's higher risks of employment disruption are thus seen as central to the explanation of gender differences in job-skill investments. Under this light, understanding the sources of variation in women's assessments of their expected tenure becomes crucial.

Expected tenure has been modeled as a function of individual characteristics, including preferences, but also of the informational structure in which actors are embedded. Introducing the informational structure in the individual skill-investment decision constitutes the main theoretical contribution of this paper. It has been argued that individuals draw information from both the past experiences of their closest reference groups as well as from the current societal distribution of relevant outcomes. These informational effects have been modeled using retrospective data on the occupations of respondents' mothers as well as regional-level information on both the proportion of women in jobs requiring high skill investments and the proportion of cooperative men. Both random-intercept and fixed-effect models show that these three variables exert a significant impact on women's probability to invest in specific-skills and this net of several controls, including individual preference heterogeneity.

These findings suggest that the informational structure plays a significant role in job-allocation decisions. This is an important finding that can help us explain why job-specialization investments continue to be patterned by gender even in the face of marked attitudinal convergence (see, e.g., Fogli and Veldkamp 2007). To the extent that prospective tenure assessments play a key role in the evaluation of skill-investment risks, macro-level distributions are meant to exert a significant influence on individuals' belief formation. The effect of these distributions on individual choices illustrates the power of example. It is because individuals draw on what others have done before them that history matters.

Future research could extend this model in two interrelated directions: First, by looking at the impact of larger institutional effects on job-skill investment decisions; and secondly by incorporating employers' behavior to the theoretical framework. The former direction would allow us to exploit the comparative potential of the ESS2 data and to test for possible gender-policy, welfare-regime and production-regime effects, along the lines of recent contributions

(see, e.g., Chang 2000; Estevez-Abe 2005; Mandel and Semyonov 2005; Tåhlin 2007); whilst the latter avenue would complement the theoretical perspective proposed here by incorporating the demand-side. This latter task will be facilitated by the consideration that employers also make assessments on their workers' prospective tenure in a context of highly imperfect information. Hence they will be similarly likely to draw on distributional inference as a means to inform their skill-investment choices.

APPENDIX

Table a1. Maximum Likelihood Factor Analysis on the Skill-Content of Jobs, ESS2 (2004)

(Maximum likelihood factors; 1 factor retained)

Factor	Variance	Difference	Proportion	Cumulative
1	1.47961		1.0000	1.0000

Test: 1 vs. no factors. Chi2(4) = 8464.46, Prob > chi2 = 0.0000

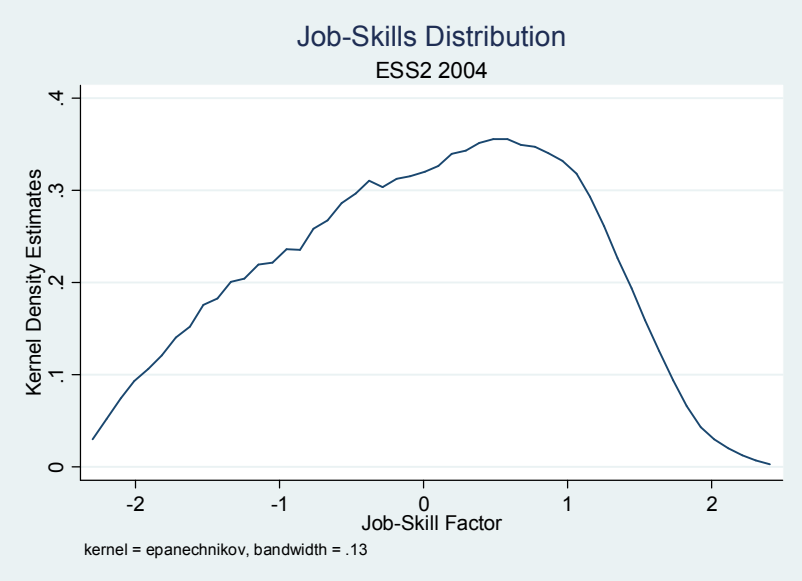
Test: 1 vs. more factors. Chi2(2) = 77.52, Prob > chi2 = 0.0000

		Factor Loadings	
Variable	Description	1	Uniqueness
learning	Degree of agreement with: "*my job requires that I keep learning new things*". 4-interval Likert Scale	0.65102	0.57623
svpr	Self-assessed time required to learn to do respondents' jobs well for someone with the right qualification. 8-interval Likert Scale	0.55507	0.69186
skillc	Has Rs' attended a job-skill training course in the last 12 months?	0.53628	0.71237
jobedu	Self-assessed evaluation of the number of years of post-compulsory education needed for the job.	0.67829	0.53997

N= 13, 214
log likelihood = -38.767207

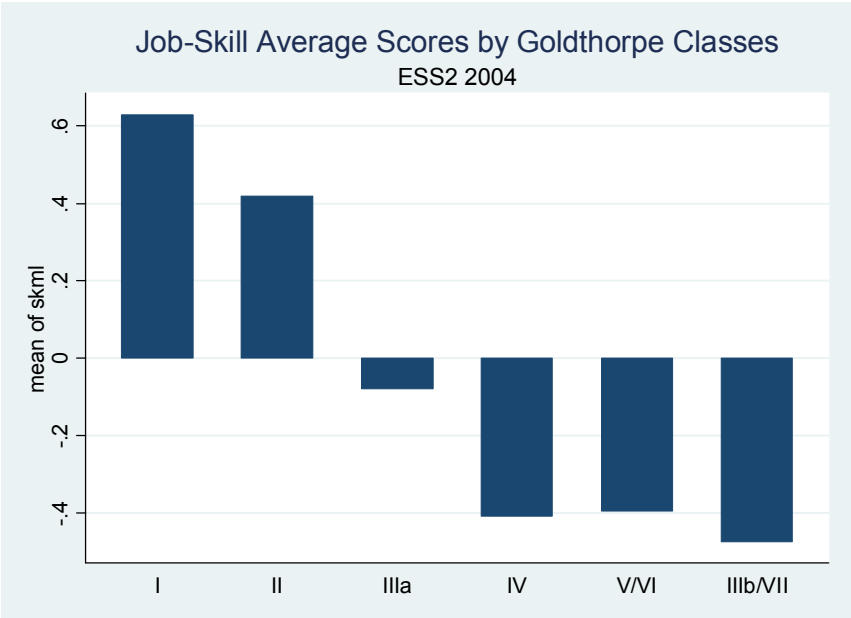
Source: ESS2, First-Available Countries (2004).

Figure a1. The Density Function of the Job-Skill Factor, ESS2 (2004)



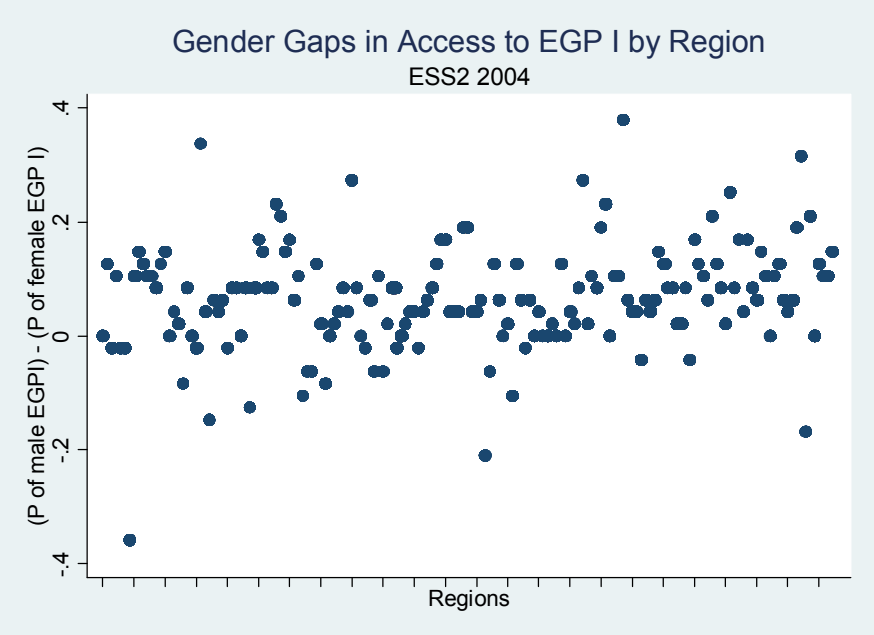
Source: ESS2, First-Available Countries (2004).

Figure a2. Job-Skill Factor Scores by Class, ESS2 (2004)



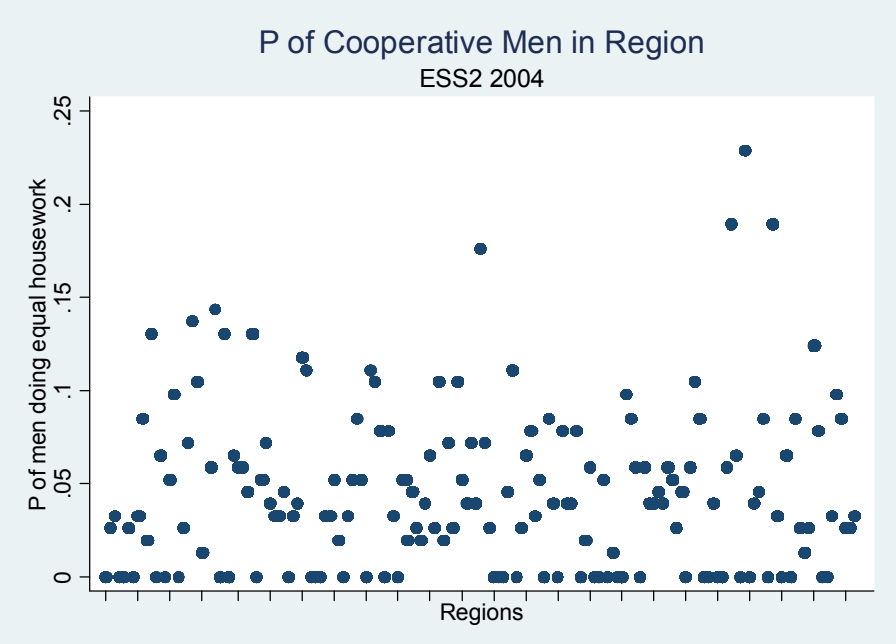
Source: ESS2, First-Available Countries (2004).

Figure a3. The Regional Visibility of High-Skilled Women, ESS2 (2004)



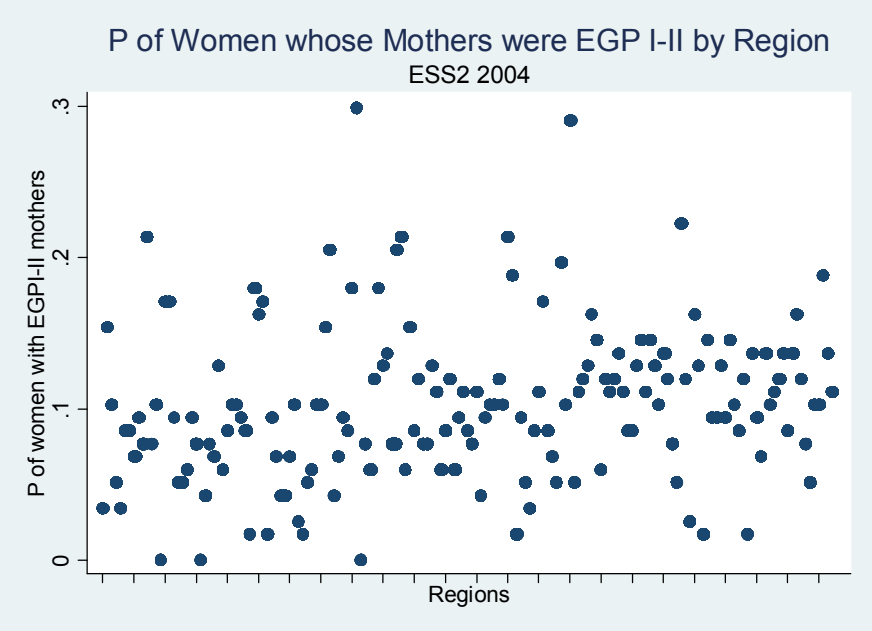
Source: ESS2, First-Available Countries (2004).

Figure a4. The Regional Distribution of Cooperative Men, ESS2 (2004)



Source: ESS2, First-Available Countries (2004).

Figure a5. The Regional Distribution of Mothers in type-H Jobs, ESS2 (2004)



Source: ESS2, First-Available Countries (2004).

Table a2. Regressions on Job-Skill Factor. Different Specifications of the Preferred Model, ESS (2004)

	RANDOM-INTERCEPT (Level-Two=Countries)		*FIXED-EFFECTS (Level-Two=Countries)*		*RANDOM-INTERCEPT (Level-Two=Regions)*	
	Sex coded female = ref.	*Sex coded male = ref.*	*Sex coded female = ref.*	*Sex coded male= ref.*	*Sex coded female = ref.*	*Sex coded male= ref.*
Input variables	b Sig.	b Sig.	b Sig.	b Sig.	b Sig.	b Sig.
Sex	0.448****		0.449****		0.451****	
	(0.047)		(0.047)		(0.047)	
Age	0.019****		0.018****		0.020****	
	(0.004)		(0.004)		(0.003)	
Age^2	0.0002****		0.0002****		0.0002****	
	(0.00004)		(0.00004)		(0.00004)	
Years of Schooling	0.086****	0.068****	0.087****	.069****	0.086****	.068****
	(0.003)		(0.003)		(0.002)	
Years of Schooling*Sex	-0.018****		-0.018****		-0.018****	
	(0.003)		(0.003)		(0.003)	
Ambition Index	0.092****		0.091****		0.096****	
	(0.007)		(0.007)		(0.007)	
Sex-role attitudes (familialism)	-0.017****		-0.017****		-0.017****	
	(0.002)		(0.002)		(0.002)	
Mother Professional when R was 14	0.135****	0.07***	0.135****	0.070***	0.134****	0.070***
	(0.024)		(0.024)		(0.024)	
Mother Professional*Sex	-0.065**		-0.064**		-0.064*	
	(0.034)		(0.034)		(0.034)	
P Cooperative Men in Region	0.531**	-0.32 n.s.	0.503**	-0.36♦	0.889****	0.05 n.s.
	(0.229)		(0.231)		(0.276)	
P Cooperative Men in Region*Sex	-0.860***		-0.863***		-0.843***	
	(0.298)		(0.299)		(0.300)	
Regional Gender-Gap in Professionals	-0.237*	0.14n.s.	-0.207♦	0.17 n.s.	-0.457***	-0.06 n.s.
	(0.131)		(0.132)		(0.145)	
Reg. Gender Gap in Professionals*Sex	0.377**		0.373**		0.393***	
	(0.162)		(0.162)		(0.163)	
Industry-Region Skill Demand	0.631****		0.631****		0.641****	
	(0.016)		(0.017)		(0.016)	
Industry-Region Unemployment Level	-0.115*		-0.107**		-0.164***	
	(0.063)		(0.063)		(0.063)	
constant	-1.916****		-1.915****		-1.920****	
	(0.094)		(0.092)		(0.092)	
N of observations =	*12,567*		*12,567*		*12,567*	
N of groups =	*19*		*19*		*164*	
Log likelihood =	*-11903.884*				*-11951.494*	
sigma_u	*0.103**** (0.018)*		*0.111*		*0.104**** (0.018)*	
sigma_e	*0.622**** (0.004)*		*0.623*		*0.621**** (0.004)*	
Likelihood-ratio test of sigma_u=0	*213.52****				*118.31****	
R^2 Within =			0.3884			
R^2 Between =			0.8545			
R^2 Overall =			0.4301			

Notes: All models control for marital status, size of the firm, firm's activity, unionization*sex and father's educational level when respondent was 14.
**** significance ≤ 0.001; *** significance ≤ 0.01; ** significance ≤ 0.05; * significance ≤ 0.1 ♦ Sig. ≤ 0.12.
Source: Calculated by the author from European Social Survey, Second Round, First-Available Countries (2004).

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