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Gender discrimination and intergenerational transmission of preferences

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This paper provides an explanation for the existence of gender discrimination in the labour market focusing on the intergenerational transmission of preferences related to the attitude of women towards jobs and family. Changes in women's preferences over generations depend on the socialization efforts of their parents which in turn are influenced by both the firm's expected recruitment policy and the expected utility from household care. We obtain two types of steady state equilibria: the discriminatory equilibrium, in which women are segregated to low-paid jobs, and the non-discriminatory equilibrium, in which women are hired in highly-paid jobs. The conditions of convergence to each equilibrium are analysed.

1. Introduction

The role of gender differences in preferences is emphasized in the discussion of gender differences in labour market outcomes. It is commonly assumed that men and women differ in their preferences for market versus non-market work. The distribution of preferences among groups can lead to gender differences in labour force participation, job separation, effort expelled on the job, human capital investment, etc ...[1] This labour market behavior affects the value to employers of offering jobs with particular characteristics. To give but a few examples, the higher women' withdrawal rates from the labour force explains why women are overrepresented in jobs with piece-rate system of payment (Goldin, 1986) or why firms match women to jobs with less training requirements (Royalty, 1996). Bulow and Summers (1986) point out that differences in separation rates or in the utility women get from home production contribute to explain why women are overrepresented in jobs which are easily monitored. Thus the differences in the

[1] Clear evidence of the link between gender differences in preferences and labour market behavior is, for example, that a higher proportion of women than men leave their jobs for personal or household considerations. Approximately 6% of women, compared to only 2.6% of men, leave because of personal health problems or illness in the family. Men almost never leave the firm because of illness in the family (Sicherman, 1996).

preferences for home work tend to lead to large differences in the characteristics of the jobs occupied by women and men. Differences in job characteristics are important as job attributes explain a substantial part of the male-female wage differential (see, for example, Macpherson and Hirsch, 1995; Blau and Kahn, 1997).

In this regard, Altonji and Blank (1999) point out:

> a major issue, of course, is the source of gender differences in preferences. Closely related to this is the question of how and why preferences might evolve over time, a topic on which there is little direct evidence. Pre-market gender discrimination in child-rearing practices or in the educational system may be one source of differences in preferences. Of course, the differential treatment of boys versus girls may be a rational response by parents to market discrimination. For example, altruistic parents who know that their female children will face discrimination in traditionally male occupations may endeavor to shape the preferences of their children so that they will be comfortable in traditional roles.[2]

Despite the importance of the preferences explanation for gender differences in the labour market, a major weakness of the theoretical literature continues to be a lack of formal models that analyse the source and evolution of preferences (Cain, 1986).

Recent trends of women's labour force participation rates, fertility, educational attainment, marriage, and female-headed household may reflect changes in women's preferences. Nevertheless, preferences are private information and it is difficult to know their true evolution. These changes may reflect also changes in women's constraints or relative productivities. Despite this difficulty, a large sociological literature documents the change in women's preferences and gender roles over the past thirty years (Thornton *et al.*, 1983; Vandenheuvel, 1991; Moen, 1992; Dex, 1988; Scott, 1999), including women's attitudes with respect to the labour market.[3] Women behavior at the labour market may be changing because the preferences and gender roles transmitted during the socialization process have evolved.[4] Given that parents' expectations about the constraints that their daughters will face in the labour market and also in the family must have changed over the past 30 years, the effort to transmit a particular gender role or preference must also have changed. But, in the presence of feedback effects, as new cohorts of women with different preferences towards career and family enter the labour market, firms will update their hiring policy. Altogether this means that there is a two-way causality between cultural transmission of preferences over generations of women and the optimal hiring policy of firms with regard to women.

This paper focuses on the formation, evolution and stability of the distribution of preferences in the women's population and its relationship with the hiring policy

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[2] Altonji and Blank (1999, p.3165).

[3] See Hakim (2000, 2002) for a study of how lifestyle preferences are a major determinant of women's differentiated labour market careers.

[4] See Hazan and Maoz (2002) for a model about the dynamics of tradition or social norms in women's labour force participation.

of the firms in a labour market in which statistical discrimination might be optimal.[5] We present an overlapping generations model where, both, the population distribution of preferences with regard to family and career and the hiring policy of the firms, which may be discriminatory towards women or not, influence one another and are determined endogenously and simultaneously in the long run.

In our model, firms decide whether to assign each female applicant to a highly-paid job, with high productivity in which effort and commitment are crucial variables, or to a low-paid job, with lower productivity, where effort is easily monitored.

Individual effort is limited and must be allocated among all activities. Effort expended on home work necessarily reduces the amount of effort available for market work.[6] Thus, women have to decide whether to exert a high or low effort on the job. We assume that there are two types of preferences in the women population: job-priority preferences and family-priority preferences. The utility that a woman gets from a job in each period is the sum of the wage and an extra satisfaction component. The family-priority women get this satisfaction if they exert low effort on the job since it allows them to spend more effort on family responsibilities. On the other hand, women with job-priority preferences get this satisfaction expending high effort since it confers on them, for instance, status and recognition within the firm. If effort were observable, the preferred strategy of the firms would be to create highly-paid jobs for women committed to making a high effort, that is, for women with job-priority preferences, and low-paid jobs for those who make low effort because they have family-priority preferences. However, firms make decisions in a context of incomplete information. They only know the distribution of preferences in the women's population in each period.

Socialization determines the distribution of preferences of women. We draw from the model of cultural transmission of preferences by Bisin and Verdier (1998, 2000a, b, 2001). Children acquire preferences from their parents (vertical transmission) and from other adults (oblique transmission). Parents are altruistic towards their offspring, but in a particular form of altruism called imperfect empathy (see, Bisin and Verdier, 1998). The distribution of preferences in the women population, therefore, evolves over time, and is shaped by the socialization effort of both types of mothers which itself is determined by the actual distribution of preferences (since oblique transmission is a substitute for vertical transmission) and by their expectations about the firms' recruitment policy. But in turn, the firms optimal decision between a non-discriminatory policy and a discriminatory

[5] For a formal and complete treatment of statistical discrimination see Aigner and Cain (1977) who develop the approach of Phelps (1972).

[6] As hypothesized by Becker (1985), household responsibilities affect wages by reducing the amount of effort available for market work. Hersch and Stratton (2002) found that because women spend substantially more time on housework, controlling for housework time increases the explained component of the wage gap by 14 percentage points.

policy depends on the current distribution of preferences within the women population.

Our main result is that there are two possible equilibria on the long run in our simplified economy. A discriminatory steady state in which most parents transmit family-priority preferences and firms only assign women to easily monitored, low skilled jobs, and a non-discriminatory steady state in which most parents socialize their daughters in job-priority preferences and employers assign women to high skilled jobs. The convergence to one steady state or another depends on the parameter values. These parameters capture factors such as productivities, wages, and profits in the two types of jobs, and the utility obtained by family-priority women from family care and household tasks, which includes the resources transferred from their partners or husbands. Thus, technology, wages, and family structure matter. But, in some cases, the initial distribution of preferences or, more interestingly, the role played by diverse mechanisms for the coordination of agents' expectations (as the implementation of some public antidiscrimination policies and the emergence of particular ideologies) is determinant.

The model may contribute to explain the convergence of most Western countries to a non-discriminatory steady state. The gender wage gap has narrowed dramatically over the past 25 year in these countries. A possible explanation is the decline in statistical discrimination of women in job assignments that our model predicts for a wide range of circumstances.[7] But, it also explain the delay in this process of convergence or the convergence of other countries to the non-discriminatory equilibrium.

The paper is organized as follows. Section 2 describes the model. Section 3 establishes the firms' recruitment policies. Section 4 examines the parents' decision problem: the socialization effort. Section 5 examines the conditions of convergence to the non-discriminatory and the discriminatory equilibria, where the stability properties of the equilibria are also examined. This section also includes an explanation of the shift from a discriminatory to a non-discriminatory steady state that has occurred in most Western countries. Finally, Section 6 summarizes the conclusions.

2. The model

We consider an overlapping generations model. The women's population is a continuum and each individual lives for two periods. During the first period, as a child, the individual is educated in certain preferences and, at the beginning of the second period, as an adult, she becomes active in the labour market and is hired by a firm. Moreover, in the second period each individual has one female offspring

[7] The decline in statistical discrimination is also pointed out by Blau and Kahn (2000, p.85) to explain the decrease in the gender wage in the 1980s.

and makes a costly decision on her (daughter's) education, trying to transmit some preferences. Hence, the size of the women's population remains constant.

2.1 Firms

Different characteristics have been used in the literature of gender discrimination to distinguish among jobs. The well-known distinction between primary and secondary jobs of dual market theory (Doering and Piore, 1971) was adapted to occupational segregation by sex (Bergman, 1974), with one labour market segment comprised of female occupations and another of male occupations. Kuhn (1993) and Barron *et al.* (1993) focus on the training requirements of jobs. Goldin (1986) and Bulow and Summers (1986) distinguish among jobs on the basis of the facility to control the workers effort on the job. This paper adopts this last approach.[8]

We assume that firms can create any quantity of two types of jobs, that we will denote $T1$ and $T2$, and decide the job that each applicant will occupy. There is neither unemployment nor a fixed structure of jobs.

$T2$ jobs are low-paid jobs with lower productivity. The workers's effort is easily monitored and evaluated in these jobs so that the wage is $\overline{w}_2$ if effort is high and $\underline{w}_2$ if effort is low. The profits obtained by a firm in this type of job also depend on effort; which could be high or low, denoted by h or l respectively.

$T1$ jobs, on the other hand, are highly-paid jobs with potentially higher productivity in which variables such as effort, creativity and commitment are crucial for the output obtained but are difficult to evaluate, making it difficult for firms to detect shirkers. To simplify, we will denote all these possible variables as 'effort'.

We assume, therefore, that the worker's effort in a $T1$ job cannot be observed by the employer. Despite the fact that output can be observed, the worker's effort cannot always be inferred from it because output will be a function not only of effort but also of a number of other exogenous random variables. In particular, we will work with a very simple moral hazard model: if a worker makes high effort $\bar{e}$ the high output (the full potential productivity) is obtained, yielding a profit H for the firm with probability one. But, if a worker shirks (makes a low effort, $\underline{e}$) the output is high with probability $(1-\alpha)$, yielding profit H for the firm, or low with probability α yielding a zero profit for the firm. Thus, low output is a perfect signal of low effort. However, high output is not a perfect signal of high effort, since a worker who shirks might obtain it if, for example, circumstantial conditions favor her. As output is verifiable, wages will be conditioned on it: the wage will be w_1 if high output is observed, and zero otherwise (i.e., a worker is fired when caught shirking).

[8] For a similar model where jobs can be differentiated on the basis of the training requirements, see Escriche (2000).

The following tables summarize the firms' expected profits and the workers' expected wages in both jobs:

Table 1

	Firm profit			Wages	
	$T1$	$T2$		$T1$	$T2$
$\bar{e}$	H	h	$\bar{e}$	w_1	$\overline{w}_2$
$\underline{e}$	$(1-\alpha)H$	l	$\underline{e}$	$(1-\alpha)w_1$	$\underline{w}_2$

We assume that $H > h > l > 0$ and $w_1 > \overline{w}_2 > \underline{w}_2 > 0$. We also make the following assumption concerning $\alpha : \alpha > (H - l)/H$, which implies that $l > (1 - \alpha)H$.

2.2 Women's preferences

Women decide whether to exert a high effort, $\bar{e}$, or low effort, $\underline{e}$, on the job. Obviously this decision has a direct effect on labour market earnings and on the utility obtained from household care. Time and effort is limited and must be allocated among all activities. The effort expended on work in the home necessarily reduces the amount of effort available for work in the labour market (Becker, 1985; Francois, 1998). We assume that there are two types of preferences in the women's population: job-priority preferences and family-priority preferences. 'Job-priority women' prefer market work and are willing to make sacrifices in their family lives, to work extra hours and on weekends and to pursue all available opportunities for professional development. 'Family-priority women', however, want to actively participate in home activities; they are not willing to have others raise their children, for example. They obtain an extra utility if they exert low-effort on the job since it allows them to spend more time and effort on family responsibilities. We denote by F the value that this type of women confer to this effort that they devote to household tasks. Although this value is a matter of tastes, it is also influenced by the quantity of effort necessary for a satisfactory performance at home. Technology improvements such as new consumers durables (washing machines, vacuum cleaners, . . .) reduce the amount of effort required to run a household and freed time for market work yielding a decrease in this value F. More importantly, a basic determinant of F are the resources a woman may expect to receive from her husband or partner to compensate the higher effort that she spends on household tasks and child-rearing. In a traditional society where most women get married and divorce is not frequent, the value of F would be very high because of the relatively safe and high level of resources transferred from men to women in marriage. However, if the rates of divorce are high and nonmarriage increases, the value of the parameter F will be low because the economic support of women will diminish and get more uncertain (Edlund and Pande, 2002 Johnson and Skinner, 1986; Akerloff *et al.*, 1996;).

Due to the difference in preferences between both types of women, the payoff they obtain from a job also differs, although the wage is the same.[9] The following table shows the payoff of both types of women in each type of job:

Table 2

	Job-priority woman			Family-priority woman	
	$T1$	$T2$		$T1$	$T2$
$\bar{e}$	w_1	$\overline{w}_2$	$\bar{e}$	w_1	$\overline{w}_2$
$\underline{e}$	$(1-\alpha)w_1$	$\underline{w}_2$	$\underline{e}$	$(1-\alpha)w_1 + F$	$\underline{w}_2 + F$

Therefore high-effort $\bar{e}$ is a dominant strategy for job priority women (hereafter, *JP* women) whatever job she is matched with. However, we assume that the value assigned by family-priority women (hereafter, *FP* women) to household tasks is high enough so that they always prefer low-effort on the job. Formally, this implies that

$$F > \alpha w_1 > \left(\overline{w}_2 - \underline{w}_2\right) \tag{1}$$

To make things interesting, we assume also that *FP* women prefer the highly paid job, $T1$ to a $T2$ job, formally

$$(1-\alpha)w_1 > \underline{w}_2$$

This implies that if firms offer a $T1$ job to a *FP* woman she will accept, instead of revealing her preferences or type.

In this paper, we focus on the existence of discrimination against women even if the firms can supply any quantity of both types of jobs. In this particular context, the firms' recruitment policy of female workers is completely independent of the policy concerning male workers although the distribution of preferences among men is different.[10]

[9] It could be considered that job-priority women obtain a non-monetary payoff, denoted by J, from high effort on the job. A high job effort (or high job commitment) might have compensations such as improved status within the firm or good relationships with colleagues. We omit this variable to keep the model as simple as possible.

[10] We consider that all men have job-priority preferences. Undoubtedly, there are men that focus their effort on household responsibilities but they are in a clear minority. Thus an homogeneous job-priority distribution of preferences among men and a heterogeneous distribution of preferences among women is a good approximation of reality.

2.3 The socialization process and the dynamic of preferences among the women's population

Socialization determines the distribution of preferences of women. We will draw from the model of cultural transmission of preferences developed by Bisin and Verdier (1998, 2000a, b, 2001). Children acquire preferences through the observation, imitation and learning of cultural models which they encounter. In particular, children are first exposed to their families, and then to the population at large. So, we assume both vertical transmission, with offspring learning from their parents, and oblique transmission, with offspring learning from other adults. Parents are altruistic and they attempt to socialize their children to a particular trait. The utility they expect their children will obtain in the labour market affects their own utility.

The socialization of an individual occurs in two steps. First, the girl is exposed to the mother's model and adopts her preferences with a certain probability τ^i, $i \in \{j, f\}$, where j denotes *JP* women and f denotes *FP* women; τ^i is also the socialization effort made by a mother of type i. With probability $1 - \tau^i$, the girl remains naive and she adopts the preferences of other adult woman with whom she is randomly matched.

The fraction of job-priority women at time t among the women's population will be denoted by q_t (with the women's population normalized to one). The transition probabilities P_t^{iz} that a parent of type i has a child with preferences of type z are given by

$$P_t^{jj} = \tau^j + (1 - \tau^j)q_t \tag{2}$$

$$P_t^{jf} = (1 - \tau^j)(1 - q_t) \tag{3}$$

$$P_t^{ff} = \tau^f + (1 - \tau^f)(1 - q_t) \tag{4}$$

$$P_t^{fj} = (1 - \tau^f)q_t \tag{5}$$

For instance, P_t^{jj} is the probability that a daughter of a job-priority mother is socialized to job-priority preferences. Namely, with probability τ^i, she adopts her mother preferences and with probability $(1 - \tau^j)$ she adopts these preferences of other *JP* women with whom she is randomly matched.

Given the transition probabilities P_t^{iz}, the fraction q_t of adult *JP* women in period $t + 1$ is given by

$$q_{t+1} = q_t + q_t(1 - q_t)(\tau^j - \tau^f) \tag{6}$$

which is the equation on differences that shows the dynamic of the distribution of preferences among women's population.

3. The optimal recruitment policy of firms

In a complete information framework, firms would hire job-priority women for $T1$ jobs, and family-priority women for $T2$ jobs because $l > (1-\alpha)H$ and, moreover, both types of women prefer to be matched with $T1$ jobs. However firms make such decisions within a context of incomplete information since they can not identify the priority-type of a particular applicant. So, a relevant factor in the recruitment policy of the firms is the proportion of *JP* women in the population. We assume that firms know this proportion and use this 'gender' information so that statistical discrimination arises.

In such a situation a firm can adopt one of two possible policies: it can match all women with $T2$ jobs (hereafter, a discriminatory policy σ^D) or match all women with $T1$ jobs (a non-discriminatory policy σ^{ND}).[11] The expected payoff per match of the discriminatory policy is

$$\pi^D = q_t h + (1-q_t)l \tag{7}$$

since firms obtain h from *JP* women and l from *FP* women in $T2$ jobs. And the expected payoff per match for a firm which adopts a non-discriminatory policy is

$$\pi^{ND} = q_t H + (1-q_t)(1-\alpha)H \tag{8}$$

Firms prefer a non-discriminatory policy if $\pi^{ND} > \pi^D$. Comparing (7) and (8) we obtain that the condition for selecting σ^{ND} is that the fraction of job-priority women is higher than a *c*ritical *v*alue denoted by q^c, that is,

$$q_t > \frac{l+\alpha H - H}{l+\alpha H - h} = \frac{l-(1-\alpha)H}{(l-(1-\alpha)H)+(H-h)} = q^c \tag{9}$$

It is easy to check that q^c increases with h, l and α and decreases with H. Thus, this critical value, q^c, is determined by a set of factors. One of these factors is the difference in profits, per period, $(H-h)$ between having the *JP* women well matched (with $T1$ jobs) or wrongly matched (with $T2$ jobs). The difference $(H-h)$ can also be interpreted as the gap in profits per period between high-productivity jobs and low-productivity jobs when workers exert high effort on the job. The greater this difference is, the higher the range of q_t will be for which the non-discriminatory policy is advantageous. Obviously, when this difference tends to zero, the firm will not be able to take the risk of adopting a non-discriminatory policy and, formally, the critical value q^c tends to one. Another explicative factor is the difference $(l-(1-\alpha)H)$ between the profits, per period,

[11] As all men have job-priority preferences, men would never be matched with jobs $T2$. Then, we refer as discriminatory policy the firms' strategy of matching women with $T2$ jobs.

of having a *FP* women well matched ($T2$ job) or wrongly matched (in a $T1$ job). The higher the difference $(l-(1-\alpha)H)$ is, the more relevant it is to have this *FP* women in $T2$ jobs, that is, it is more profitable for firms to adopt the discriminatory policy. The difference $(l-(1-\alpha)H)$ can also be considered as the gap in profits between low-productivity jobs and high-productivity jobs when workers exert low effort on the job.

The following lemma summarizes the main results of this section.

Lemma 1 The optimal firms' policy, denoted by $\hat{\sigma}(q_t)$, is the non-discriminatory policy if the fraction of job-priority women q_t in the population is higher than a critical level, q^c, or the discriminatory policy if this fraction q_t is lower; that is

$$\hat{\sigma}(q_t) = \begin{cases} \sigma^{ND} & \text{if } q_t \geq q^c \\ \sigma^{D} & \text{if } q_t < q^c \end{cases} \tag{10}$$

where q^c is given by (9).

4. The socialization effort choice of the families

Parents are altruistic and care about their offspring's well-being. The expected utility their children will obtain in the labour market depends on their preferences. As a consequence, parents try to transmit the more valuable preferences through socialization process taking into account their own expectations about firms' policy.

There are many dimensions through which it is costly for parents to socialize their children to a certain preference trait. Education is time-consuming, it conditions the parents' choice of neighborhood and school in order to in turn affect the socio-cultural environment in which their children grow up and so on. Let $c(\tau^i)$ denote the cost of socialization effort τ^i, $i \in \{j, f\}$. For simplicity we consider a specific functional form $c(\tau^i) = (\tau^i)^2/2k$, with $k > 0$, although similar results can be obtained with any increasing and convex function. Formally, parents choose the socialization effort $\tau_t^i \in [0, 1]$ at time t, that solves the following maximization problem

$$\max_{\tau_t^i} P_t^{ii}(\tau_t^i, q_t)V_t^{ii}(\sigma_{t-1}^e) + P_t^{iz}(\tau_t^i, q_t)V_t^{iz}(\sigma_{t+1}^e) - c(\tau_t^i) \tag{11}$$

where P_t^{iz} are the transition probabilities and $V_t^{iz}(\sigma_{t+1}^e)$ is the utility a parent of type i attributes to his child of type z if σ_{t+1}^e is the expectation on the firms' policy for period $t+1$. As in Bisin and Verdier (1998), we assume that parents perceive the welfare of their children only through the filter of their own preferences, that is, parents evaluate the payoff the child will obtain from their own point of view using their own payoff matrix.[12] Thus, parents obtain a higher utility if their children

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[12] This particular form of myopia is referred to as 'imperfect empathy' by Bisin and Verdier (1998, 2000a, b, 2001). These authors cite some evidence of this form of altruism.

share their preferences. This clearly implies that $V^{jj} \geq V^{jf}$ and $V^{ff} \geq V^{fj}$ as will be confirmed by the analysis that follows.

Maximizing with respect to τ_t^i we obtain the following first-order condition

$$\frac{dP^{ii}(\tau_t^i, q_t)}{d\tau_t^i} V^{ii}(\sigma_{t+1}^e) + \frac{dP^{iz}(\tau_t^i, q_t)}{d\tau_t^i} V^{iz}(\sigma_{t+1}^e) = \frac{\tau_t^i}{k} \tag{12}$$

Differentiating the transition probabilities, (2)–(5) and substituting the result into (12), it follows that

$$k\left[V^{jj}(\sigma_{t+1}^e) - V^{jf}(\sigma_{t+1}^e)\right](1 - q_t) = \tau_t^j \tag{13}$$

$$k\left[V^{ff}(\sigma_{t+1}^e) - V^{fj}(\sigma_{t+1}^e)\right]q_t = \tau_t^f \tag{14}$$

Hereafter, we denote the relative gains the parents perceive of socializing their children in their own values by $\Delta V^j(\sigma_{t-1}^e) = V^{jj}(\sigma_{t+1}^e) - V^{jf}(\sigma_{t+1}^e)$ and $\Delta V^f(\sigma_{t+1}^e) = V^{ff}(\sigma_{t+1}^e) - V^{fj}(\sigma_{t+1}^e)$. In order to guarantee interior solutions $\tau^i \in (0, 1)$, we assume that $\frac{1}{k} > \max\left[V^{ii}(\sigma_{t+1}^e) - V^{iz}(\sigma_{t+1}^e)\right]$, that is, k is small enough.

It follows from the first-order conditions that the optimal educational efforts depend on the current distribution of preferences in the women's population and on the relative gains for parents from transmitting their own values which are, in turn, determined by the parents expectations of the firms' policy for the next period. Let $\hat{\tau}^j = \hat{\tau}_t^j(q_t, \sigma_{t-1}^e)$ and $\hat{\tau}^f = \hat{\tau}_t^f\left(q_t, \sigma_{t+1}^e\right)$ be the optimal socialization efforts. Let us analyse how the socialization effort depends on q_t. Differentiation of the first-order conditions, (13) and (14), with respect to q_t yields

$$\frac{d\hat{\tau}^j}{dq_t} = -k\Delta V^j(\sigma_{t+1}^e) < 0 \tag{15}$$

$$\frac{d\hat{\tau}^f}{dq_t} = k\Delta V^f(\sigma_{t+1}^e) > 0 \tag{16}$$

The optimal level of effort of a job-priority parent decreases with the current fraction of job priority women in the population. The reason is that the larger the fraction q_t is, the better children are socialized to the job-priority preferences by the social environment. In other words, oblique transmission acts as a substitute for vertical transmission.[13] Furthermore, the larger the fraction q_t is, the more family-priority parents must increase their socialization effort to offset the pressure of the environment if they want their children to share their same preferences.

[13] Bisin and Verdier (2001) refer to this feature of the socialization process as the "cultural substitution property".

We know that preferences among the women's population evolve over time, according to (6), depending on the relative optimal effort of both types of parents in transmitting their values. Likewise, these optimal efforts are determined by expectations regarding the firms' policies which, in turn, are determined by the current distribution of preferences, as proved in the previous section. Therefore, both the distribution of preferences among women and the women's recruitment policy of the firms influence each other and are determined endogenously and simultaneously.

5. The distribution of women's preferences and firms' policy in the long run

In this section, we analyse the steady state of the economy which will be characterized by a recruitment policy of the firms and a distribution of preferences among the women's population.

It will be useful to know the dynamic behavior of q_t under a stationary policy expectation, i.e. $\Delta V^j(\sigma^e_{t+1})$ and $\Delta V^f(\sigma^e_{t+1})$ constant for all t. Let us start assuming that firms follow a non-discriminatory policy for all q_t. Then, the expected utility that a parent of type i attributes to his child of type z when this policy is expected, $V^{iz}(\sigma^{ND})$, is given by

$$V^{jj}(\sigma^{ND}) = w_1$$
$$V^{jf}(\sigma^{ND}) = (1-\alpha)w_1$$
$$V^{ff}(\sigma^{ND}) = F + (1-\alpha)w_1$$
$$V^{fj}(\sigma^{ND}) = w_1$$

Recall that in order to evaluate $V^{iz}(\cdot)$ a parent uses her own utility function. For instance, $V^{jf}(\cdot)$ is the utility of a *JP* mother if her daughter has family-priority preferences. In this expression the payoff F does not appear, although the mother knows that her daughter will choose low effort giving priority to family work. Notice that $V^{jj} \geq V^{jf}$ and $V^{ff} \geq V^{fj}$ which means that parents obtain a higher utility if their children share their own preferences.

From the above expressions, the relative gains for parents of transmitting their own preferences if a non-discriminatory policy is expected are

$$\Delta V^j(\sigma^{ND}) = \alpha w_1$$
$$\Delta V^f(\sigma^{ND}) = F - \alpha w_1$$

Substituting into (13) and (14) we obtain the optimal educational effort functions

$$\hat{\tau}^j_t(q_t, \sigma^{ND}) = k\alpha w_1(1-q_t)$$
$$\hat{\tau}^f_t(q_t, \sigma^{ND}) = k(F-\alpha w_1)q_t$$

Thus, substituting these expressions into eq. (6), we obtain the dynamics of the distribution of preferences when a stationary non-discriminatory policy is expected

$$q_{t+1} = q_t + q_t(1 - q_t)\, k\, (\alpha w_1 - F q_t)$$

This dynamics has three steady states (denoted by q_s): $q_s = 0,\ q_s = 1$, and the interior point

$$\overline{q}_s = \frac{\alpha w_1}{F} \tag{17}$$

where $\overline{q}_s$ solves $\hat{\tau}_t^j(q_s, \sigma^{ND}) = \hat{\tau}_t^f(q_s, \sigma^{ND})$, that is, both socialization efforts are equalized.

Now, let us assume that firms follow a discriminatory policy for all q_t. Accordingly, if adult women expect this policy the expected utilities, $V^{iz}(\sigma^D)$, are given by

$$V^{jj}(\sigma^D) = \overline{w}_2; \quad V^{jf}(\sigma^D) = \underline{w}_2$$
$$V^{ff}(\sigma^D) = (\underline{w}_2 + F); \quad V^{fj}(\sigma^D) = \overline{w}_2$$

so the relative gains for parents are

$$\begin{aligned} \Delta V^j(\sigma^D) &= (\overline{w}_2 - \underline{w}_2) \\ \Delta V^f(\sigma^D) &= F - (\overline{w}_2 - \underline{w}_2) \end{aligned} \tag{18}$$

And by substitution into (13) and (14), the optimal socialization effort functions are given by

$$\hat{\tau}_t^j(q_t, \sigma^D) = k(\overline{w}_2 - \underline{w}_2)(1 - q_t)$$
$$\hat{\tau}_t^f(q_t, \sigma^D) = k[F - (\overline{w}_2 - \underline{w}_2)]q_t$$

Thus, the dynamics of the distribution of preferences when a discriminatory policy is expected is

$$q_{t+1} = q_t + q_t(1 - q_t)\, k\, [(\overline{w}_2 - \underline{w}_2) - F q_t]$$

This dynamics has also three steady states: $q_s = 0,\ q_s = 1$ and the interior one

$$\underline{q}_s = \frac{\overline{w}_2 - \underline{w}_2}{F} \tag{19}$$

where $\underline{q}_s$ solves $\hat{\tau}^j(q_s, \sigma^D) = \hat{\tau}^f(q_s, \sigma^D)$. Notice that $\underline{q}_s < \overline{q}_s$, given the assumption $\alpha w_1 > \underline{w}_2 - \underline{w}_2$.

Nevertheless, as we stated in the previous section, firms do not follow the same policy for all distribution of preferences. For all q_t greater than q^c they follow a non-discriminatory policy and for all q_t smaller than q^c they prefer a discriminatory policy.

We will assume that women have perfect foresight, equivalent to rational expectations in this deterministic context. Namely, women in period t have an expectation on the policy for the next period, σ^e_{t+1}, which is self-confirmed, i.e., $\sigma^e_{t+1} = \sigma_{t+1}$. Therefore, the dynamics of this society, under rational expectations, is characterized by the following two-branch dynamics

$$q_{t+1} = q_t + q_t(1 - q_t)\, k\,(\alpha w_1 - Fq_t) \qquad \text{if } q_{t+1} \geq q^c \qquad (A)$$

$$q_{t+1} = q_t + q_t(1 - q_t)\, k\,[(\overline{w}_2 - \underline{w}_2) - Fq_t] \quad \text{if } q_{t+1} < q^c \qquad (B)$$

We will denote the former as dynamics A or, alternatively, $F_A(\cdot)$, and the latter as dynamics B, or, alternatively, $F_B(\cdot)$. In the 'if' condition, q^e_{t+1} has been replaced by q_{t+1} under the perfect foresight assumption. Notice that there is a discontinuity in $q_{t+1} = q^c$.

The steady states $q_s = 0$ and $q_s = 1$, are unstable. These steady states are completely homogenous distribution of preferences, that is, all women being family-priority ($q_s = 0$) or all women being job-priority ($q_s = 1$). As mentioned in Section 4, if job-priority parents are in a minority (that is, q_t is very close to 0), their socialization effort will be very intensive in an attempt to offset the effect of oblique transmission. In this context, $\hat{\tau}^j$ exceeds $\hat{\tau}^f$ and job-priority preferences will spread over generations preserving their presence in the society. A similar argument explains why a degenerate distribution of preferences in $q_s = 1$ is also unstable.

The process of convergence and also the particular characteristics of the stable steady state that would be achieved depend on the structural conditions of the society (wages, productivities and value of household tasks for *FP* women). The rest of the section presents the three cases that can appear.

5.1 A modern society

For some values of the parameters, which correspond to what we denote a developed and modern society, the dynamics converges for any initial condition to the steady state $\overline{q}_s$ with a relatively high proportion of job-priority women in the population and where the firms follow the non-discriminatory hiring policy.

Proposition 1 If $q^c < \underline{q}_s$, the economy converges to the non-discriminatory steady state $\overline{q}_s$.

Proof See Appendix 1. □

A set of factors favours the condition $q^c < \underline{q}_s$ stated in Proposition 1. This combination of parameters would correspond to a modern society in which (i) *FP* women do not obtain a very high payoff from household tasks because, for instance, they do not obtain a high economic support from their partners (low F), (ii) there is a high wage loss, from choosing low effort instead of high effort in the two types of jobs ($\overline{w}_2 - \underline{w}_2$ and αw_1 are high), and (iii) the gap in profits between the high-productivity jobs *T*1 and the low-productivity jobs *T*2 is relatively high (a high *H* and a low *l*).

Figure 1 shows the phase diagram in this case. Notice that q'_A is the value that yields $q_{t+1} = q^c$ with equation A and, similarly, q'_B is the value that yields $q_{t+1} = q^c$ with equation B (namely, $F_A(q'_A) = q^c$ and $F_B(q'_B) = q^c$). For any particular value of the parameters q'_A is always smaller than q'_B.

Let us describe how the society evolves over generations starting from the historically more likely initial situation where most women have *FP* preferences (that is, q_0 close to 0). Initially, women expect a discriminatory policy for the next generation. Nevertheless, as *JP* women are in a minority, their socialization effort is high in order to offset the influence of the environment. The opposite effect works for *FP* women because oblique transmission is a substitute of vertical transmission. But this difference in the socialization effort between *JP* women and *FP* women is strongly reinforced because of the structural conditions. As there is a high wage loss from choosing low effort instead of high effort in a *T*2 job (high $\overline{w}_2 - \underline{w}_2$) and the payoff from household tasks *F* for *FP* women is low, the optimal socialization effort of *JP* women, $\hat{\tau}^j$, is relatively much higher than the effort of *FP* women, $\hat{\tau}^f$. Therefore, the proportion of *JP* women $\underline{q}_t$ rapidly increases over

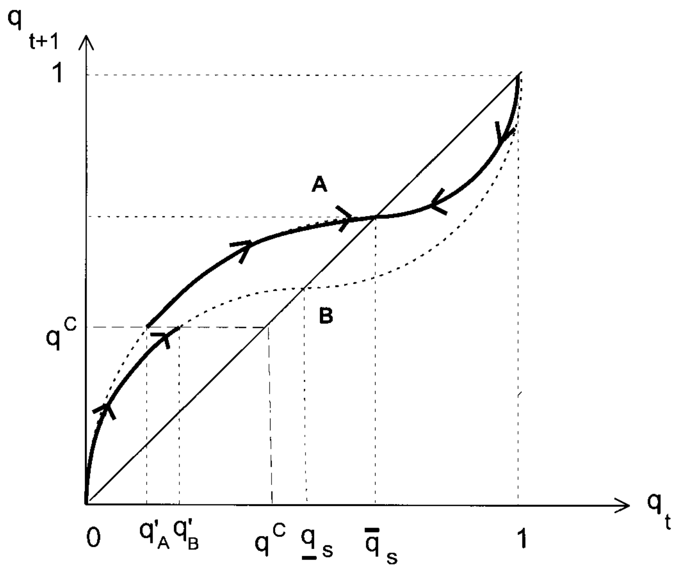

Fig. 1. Convergence to the non-discrimiatory steady state when $q^c < \bar{q}_s$.

time. If firms were to follow always a discriminatory policy, the increase in q_t would eventually result in a decrease in τ^j and in an increase in τ^f until both socialization efforts equalize at the steady state $\underline{q}_s$ (see expressions (13) and (14)). But, this cannot happen in this case because before this latter effect occurs, the fraction of *JP* women in some generation would be high enough, namely, $q_t \in (q'_A, q'_B)$, so all women will rationally expect the non-discriminatory policy for the next generation. This shift in expectations leads to an increase in $\hat{\tau}^j$ relative to $\hat{\tau}^f$, yielding a $q_{t+1} > q^c$ which self-confirms the women's expectation: from there on, firms follow the non-discriminatory policy. Consequently the economy converges to the non-discriminatory steady state $\overline{q}_s$ with a high proportion of *JP* women.

Notice that the dynamic process we have described is possible because the discriminatory policy is only optimal for the firms for distributions of preferences with a very low proportion of *JP* women, that is, q^c is low. This is obviously caused because the difference in profits between $T1$ and $T2$ jobs is high. Therefore, it is the combination of a high difference in productivity and profits in high and low skilled jobs, the high wage gap between choosing $\overline{e}$ or $\underline{e}$ in both types of jobs and a low payoff from home tasks what leads to the non-discriminatory equilibrium.

The convergence to the non-discriminatory steady state $\overline{q}_s$ is also obtained from any other initial condition. If q_0 is in the interval $(q'_B, 1)$ it follows from inspection of Fig. 1 that a unique q_t path, following dynamics A, results with q_t converging to $\overline{q}_s$. Similarly, from any $q_0 \in (0, q'_A)$ a unique path starts following dynamics B. If it reaches the interval $[q'_A, q'_B]$, then there will be a shift in expectations: women expect the non-discriminatory policy yielding a $q_{t+1} > q^c$ (by definition of q'_A) which self-confirms the previous expectation. The continuation path, following equation A, converges to $\overline{q}_s$.

5.2 A traditional society

For some values of the parameters the society could be described as traditional and less-developed. In this case the dynamics converges for any initial condition to the steady state $\underline{q}_s$ with a relatively high proportion of family-priority women in the population and where the firms follow the discriminatory hiring policy.

Proposition 2 If $q^c > \overline{q}_s$, the economy converges to the discriminatory steady state $\underline{q}_s$.

Proof See Appendix B. □

This case corresponds to a society in which (i) *FP* women obtain a high payoff from family care and home activities (high F), (ii) the expected wage loss from choosing low effort instead of high effort in both types of jobs (αw_1 and $\overline{w}^2 - \underline{w}_2$) is low and, finally, (iii) the gap in profits between the high-productivity jobs and the low-productivity jobs is relatively low (a low H and a high h).

Figure 2 shows the process of convergence to the discriminatory steady state in this type of society. The values q'_A and q'_B are defined as in the previous case.

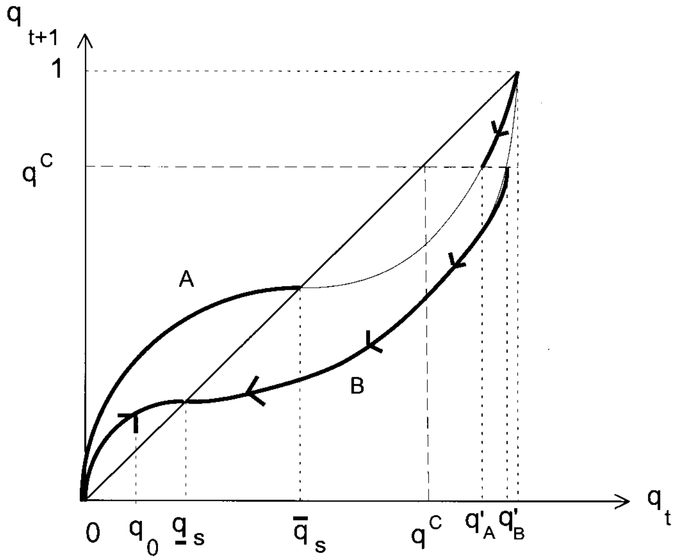

Fig. 2. Convergence to the discriminatory steady state when $q^{cv} < \bar{q}_s$.

Let us describe again the process of convergence starting from a initial situation where most women have *FP* preferences. Although initially, and similarly to the previous case, *JP* women have more incentives to socialize their children than *FP* women have, and $\hat{\tau}^j > \hat{\tau}^f$, given that $(\overline{w}_2 - w_2)$ is low and F is high, this difference is not very important and diminishes quickly with q_t. So for a low q_t, and before reaching the critical value q^c for the firm, the socialization effort of both types of women under the discriminatory policy are equalized, and the economy remains trapped in the steady state $\underline{q}_s$ with a relatively high proportion of *FP* women.

From any initial condition, the structural features that characterize this case generate a dynamics that moves the economy towards the discriminatory steady-state. Even if *JP* women were initially predominant in the population the discriminatory steady state would be achieved in the long run. For a initially very high q_0, firms will use a non-discriminatory hiring policy. But given that F is very high and αw_1 very low, the socialization effort of *FP* women would be much higher than the effort of *JP* women. The proportion of *FP* women will rapidly increase over generations and firms will find profitable to adopt the discriminatory policy (as q_t becomes smaller than q^c very soon). But this, in turn, reinforces the difference between the socialization effort of *FP* women and *JP* women and the dynamics converges to $\underline{q}_s$.

5.3 An intermediate society

Let us move next to a situation in which the structural conditions are not so extreme as in the previous cases. Aside with the structural conditions, the expectations on the firms' hiring policy will also play a crucial role in the convergence to one or another steady state, as will be confirmed in the analysis that follows. The main results are presented in the next Proposition.

Proposition 3 Assume $\underline{q}_s < q^c < \overline{q}_s$. Define q_A' such that $F_A(q_A') = q^c$ and q_B' such that $F_B(q_B') = q^c$. Then,

(i) for all $q_0 \in [q_A', q_B']$ there are two perfect foresight paths which converge to $\overline{q}_s$ and $\underline{q}_s$ respectively;
(ii) for all $q_0 \in (0, q_A')$ there is convergence to $\underline{q}_s$ if $q_A' > \underline{q}_s$ and there are two paths which converge to $\overline{q}_s$ and $\underline{q}_s$ respectively if $q_A' < \underline{q}_s$;
(iii) for all $q_0 \in (q_B', 1)$ there is convergence to $\overline{q}_s$ if $q_B' < \overline{q}_s$, and there are two paths which converge to $\overline{q}_s$ and $\underline{q}_s$ respectively if $q_B' > \overline{q}_s$.

Proof See Appendix C. □

The more relevant aspect in this case is that for relatively balanced initial distributions of preferences, $q_0 \in [q_A', q_B']$, the dynamics yields two equilibrium paths generated by rational expectations (Proposition 3 (i)). This result is due essentially to the two-way causality between preferences and hiring policies of the firms. Figure 3 presents one of the possible situations stated in Proposition 3, specifically $q_A' < \underline{q}_s$ and $q_B' < \overline{q}_s$.

When the initial state is relatively balanced, $q_0 \in [q_A', q_B']$, it is conceivable for women with preferences which are in a minority to reach a shift in the firms' hiring policy in the future, if enough socialization is made to affect the preferences of the next generation. Coordination of expectations on different types of future hiring

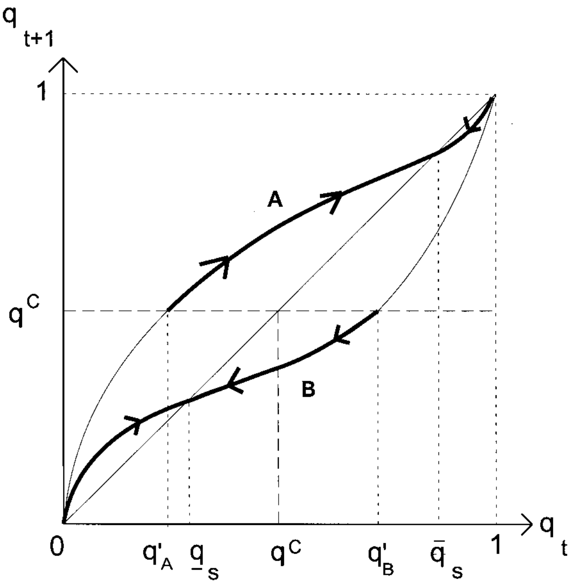

Fig. 3. Convergence to the non-discriminatory steady state when $q_s < q^{cv} < \bar{q}_s$.

policies allows then the existence of two self-fulfilling preferences paths with very different long run consequences in terms of cultural change and hiring policy. On the one hand, if for example *JP* preferences are in a minority, but expectations are coordinated on thinking that this minority trait will be dominant in the future, there is room for a perfect foresight path of preferences and a non-discriminatory hiring policy confirming this expectation. This path converges to the non-discriminatory steady state $\overline{q}_s$ with a majority of *JP* women in the long run. Formally, this is possible because $q_0 > q_A'$, and the dynamics follows branch A.

On the other hand, expectations could be coordinated on thinking that *JP* preferences remain minoritarian with no shift in the hiring policy in the future. This in turn reduces the incentives for socialization to minority preferences and self-confirms the discriminatory hiring policy anticipated for the next generation. Again, this is formally possible because $q_0 < q_B'$ and the dynamics follows eq. (B).

In this intermediate society, for more unbalanced and extreme initial distribution of preferences, $q_0 \in (0, q_A')$ and $q_0 \in (q_B', 1)$, there are two possibilities as stated in Proposition 3 (ii) and (iii). Firstly, for some values of the parameters ($q_A' > \underline{q}_s$ or $q_B' < \overline{q}_s$), the society might get trapped in one of the steady states, that is, there is a unique long run equilibrium: the discriminatory state $\underline{q}_s$ in case q_0 is very low ($q_0 < q_A'$) or the non-discriminatory state $\overline{q}_s$ in case q_0 is very high ($q_0 > q_B'$). Therefore, the coordination of expectations does not influence the long run equilibrium.[14] Secondly, with other values of the parameters we obtain that $q_A' < \underline{q}_s$ or $q_B' > \overline{q}_s$ and, in this case, for any initial condition of the dynamics, $q_0 \in (0, 1)$, we again get two perfect foresight paths supported by different society-wide expectations.

Particularly interesting is the case $q_A' < \underline{q}_s$, because from an initially low q_0 there would be a perfect foresight path of preferences which converges to the non-discriminatory steady state. The condition $q_A' < \underline{q}_s$ holds whenever there is enough wage inequality. Namely, there exists a high difference between wages obtained in high-skilled jobs ($T1$) and those obtained in low-skilled jobs $T2$. The reason is that the difference between the socialization effort of *JP* women and *FP* women, when they expect the non-discriminatory policy, would be very high because of the wage inequality. This generates a large increase in the proportion of *JP* women in the next generation which, eventually, becomes higher than q_A', before the socialization efforts of both types of parents for σ^D equalize. For this distribution of preferences a change in expectations is possible: if all women expect for the next period the non-discriminatory policy, their socialization efforts will yield an increase in the proportion of *JP* women which self-confirms the initial expectations. We are then back to the balanced distribution of preferences explained above.

[14] Nevertheless, although the initial distribution of women's preferences is determinant for converging to one steady state or another, some 'exogenous shocks' may crucially result in a discontinuity in the dynamics, yielding convergence to a different steady state. For instance, events such as the massive incorporation of women into the labour market during the Second World War can bring about a discrete change in preferences which, in turn, may cause a discontinuity in the dynamic process.

This shift on expectations could be supported by one or several different mechanisms of coordination of agents' expectations. Public Antidiscrimination Policies (for example, equal pay and equal opportunities laws), the formation of interest groups, the emergence of feminist ideologies and the commitment of firms to a non-discriminatory hiring policy, would have a determining role in what women expect for the future; they act as exogenous shocks on the expectations which will move the economy from one steady state to the other. For instance, let us assume that the society is at the steady state $\underline{q}_s$ (and recall that $q'_A < \underline{q}_s$); firms only assign women to $T2$ jobs and the preferences distribution does not change because the socialization effort of both types of women are equal. In this context, suppose that the government announces in period t an antidiscrimination legislation for the next period. If women believe that firms will observe this legislation, following the non-discriminatory hiring policy, the socialization effort of the *JP* women will become higher than the effort of *FP* women, resulting in an increase of the proportion of *JP* women in the next generation. But, this implies that for this new distribution of preferences the non-discriminating policy yields more profits to the firms than the discriminatory policy. Therefore, the government's announcement is time-consistent and credible in the sense that it is in the interest of profit-maximizing firms to observe the antidiscrimination legislation. Notice also that the non-discriminatory steady state is the efficient equilibrium in our model. This may provide an additional motive (apart from ideological reasons) for the government's legislation.

5.4 The shift to the non-discriminatory equilibrium

Over the last 25 years the gender wage gap has narrowed dramatically in the United States (and other Western countries as well). A change from a discriminatory steady state to a 'non discriminatory' steady state has occurred. In fact, the gender pay gap was roughly constant at about 60% from the late 1950s to about 1980. Between 1978 and 1999 the weekly earnings of women full-time workers increased from 61% to 76% of men's earnings and then it appears to have plateaued. The segregation index by sex shows similar patterns. It was relatively stable through the first half of the 20th century at about two-thirds and fell from 67.7 in 1970 to 52.0 in 1990 in US (Blau and Kahn, 2000).

Simultaneously with the reduction of the gender gap, we observe drastic changes in some economic and institutional conditions which directly affect the basic parameters of our model. Namely, a higher productivity gap between high-skilled jobs and low-skilled jobs, a rise in wage inequality (Blau and Kahn, 1996, 2000; Kidd and Shannon, 2002), an increase in household productivity due to the proliferation of household appliances (Greenwood, 1991), and an important change in family structure.

The first change reduces the critical value q^c, making the non discriminatory policy optimal for the firms for a wider range of distributions of preferences. The second change increases the disparity between the values of the two possible steady states, $\overline{q}_s$ and $\underline{q}_s$. Finally, the last two changes decrease the payoff from household care, F, yielding an increase in both $\overline{q}_s$ and $\underline{q}_s$.

As several authors have suggested, the change in family structure has reduced the non-labour income of women. The last three decades have witnessed a rapid decline in marriage, driven by delayed age of first marriage, increased out-of-wedlock child bearing and divorce. Therefore, the economic support that women can expect from men for child rearing and household care has declined (Johnson and Skinner, 1986; Akerloff *et al.*, 1996; Edlund and Pande, 2002). Notice that technological shocks such as the quick and massive adoption of female contraception and the legalization of abortion in the 1970s may be one of the causes of these important changes in the marriage market and the family structure, as suggested by Akerloff *et al.* (1996).

The model presented in this paper predicts the convergence to the non-discriminatory long run equilibrium if all these changes occur. As we have explained, all of them affect crucial parameters of the model, approaching the society towards what we have called an intermediate or modern society. Intuitively, the important changes in the family and in the productivity in housekeeping tasks, which imply a substantial reduction on the parameter F, has diminished the incentives of *FP* women to transmit their own preferences, irrespectively of the expected policy of the firms.[15] The decline on the socialization effort of *FP* women leads to a higher proportion of *JP* women in the following generations. But, as productivity and profits in high-skilled jobs have also increased, the non-discriminatory policy is adopted sooner by the firms, that is, for lower values of q_t. This new policy of the firms, jointly with the high wage in $T1$ jobs, in turn, increases the incentive of job priority women to transmit their own preferences and reduces even more the incentives of *FP* women.[16] Nonetheless, if the parameters correspond to the intermediate society, the change in the firms' policy would require the adoption of antidiscriminatory legislation, that is, of some mechanism of expectation's coordination. All this process converges to a non-discriminatory steady state in which most parents socialize their daugthers in job-priority preferences and employers assign women to high skilled jobs.

The implementation of antidiscriminatory policies in this period in all OECD and European Community countries (Blau and Kahn, 1996) leads us to think that the more appropriate framework to study this shift is the intermediate society. Equal pay and equal opportunity laws are unnecessary in a modern society since discrimination will disappear anyway. Nonetheless, the classification of a given economy into one of the regimes characterized in this model is beyond the scope of this paper and will require further empirical research.

[15] Formally, both optimal socialization effort functions of *FP* women, $\hat{\tau}_t^f(q_t, \sigma^D)$ and $\hat{\tau}_t^f(q_t, \sigma^{ND})$, shift downwards for all q_t.

[16] Formally, the optimal socialization effort function of *JP* women $\hat{\tau}_t^f(q_t, \sigma^{ND})$ shift upwards for all q_t, and the optimal socialization effort function of *FP* women $\hat{\tau}_t^f(q_t, \sigma^{ND})$ shifts downwards for all q_t.

6. Conclusions

The aim of this paper is to present a dynamic model where occupational segregation arises as a consequence of supply and demand factors. Women's preferences evolve over time according to the socialization effort of parents with respect to their attitudes towards jobs and family. Likewise this effort crucially depends on the expected recruitment policy of firms and on the expected payoff from child rearing and household tasks. On the other hand, firms decide what employment policy to adopt depending on the fraction of women in the population that prioritize their career given that it is not possible to know the preference of a particular woman. Hence, firms' employment policy changes when the distribution of preferences changes. Depending on this distribution firms will employ female applicants in highly–paid jobs or low-paid jobs. In our model, occupational segregation results from statistical discrimination in the matching process.

We obtain that the economy converges either to a discriminatory steady state or to a non-discriminatory steady state. The discriminatory equilibrium is characterized by a higher fraction of family-priority women and women segregated to low-paid jobs and the non-discriminatory equilibrium is characterized by a higher fraction of job-priority women and firms hire women in highly-paid jobs.

Our analysis shows that, given a combination of structural features of the economy, the expected long-run equilibrium will be the non-discriminatory steady state. These features are, firstly, a high productivity gap between high-skilled jobs and low-skilled jobs. Secondly, a low payoff obtained from child-rearing and household tasks. This low payoff is due to a reduction in the economic support a woman may expect to receive from her husband or partner-caused by changes in family structure-, and also to a low cost of domestics tasks, caused by improvements in household appliances. Thirdly, a high wage inequality between both types of jobs and between exerting low or high effort on the job. And, finally, in some cases, coordination in expectations through public antidiscrimination policies and the emergence and growth of antidiscrimination ideologies play a major role.

All these factors have evolved in this direction in most Western economies. In this context, our model will predict a shift towards the non-discriminatory equilibrium. This prediction seems to be consistent with the great improvement in recent decades of women's position in the labour market. The gender gap has narrowed and the occupational segregation has declined. Nevertheless, despite this common trait, not all economies have closed the gender gap, neither in the same extent nor at the same speed (for example, Japan versus European countries). Assuming similar structural conditions, these facts might be related to the difference in implementation of antidiscriminatory policies or to the difference in institutional factors such as family patterns. Our model also explains why some economies could become trapped in a discriminatory steady-state. If some shocks on several structural parameters do not occur or, in another cases, some mechanisms for coordination of expectations do not operate, the discrimination will persist in the long run.

Our analysis also suggests that a number of policy measures, which affect the decision on how to allocate time and effort between home work and market work, might result in that for family-priority women it is no longer a dominant strategy to exert low effort in the job. Child allowances, a lengthening of the period of maternity leave, flexible work-time arrangements, the provision of crèches and, in general, all those measures which help women to combine work and child care/housework will eventually reduce the effort required to attend family responsibilities. The socialization effort of more traditional families could diminish favouring, in such a way, the extension of *JP* preferences and, thus, the non-discriminatory steady state.

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Appendix 1

Proof of Proposition 1

Notice that as $q^c < \underline{q}_s$ (and $\overline{q}_s > \underline{q}_s$ then $\underline{q}_s$ cannot be a rest point of the two-branch dynamics (equations A and B), because for all $q_t > q^c$ equation A holds. Therefore, the dynamics has three rest points: $q_s = 0$, $q_s = 1$ and $q_s = \overline{q}_s$.

We show first that $q_s = 0$ and $q_s = 1$ are locally unstable. It is sufficient to prove that the following condition are verified:

$$\left.\frac{dq_{t+1}}{dq_t}\right|_{q_{t+1}=q_t=0} > 1 \quad \text{and} \quad \left.\frac{dq_{t+1}}{dq_t}\right|_{q_{t+1}=q_t=1} > 1$$

We will denote q_{t+1} as $F(q_t)$ in eq. (6). Hence, we rewrite the dynamic behavior of q_t as $F(q_t) = q_t + (1 - q_t)q_t(\hat{\tau}_t^j(q_t)^j - \hat{\tau}_t^f(q_t))$. By derivative, we obtain that

$$F'(q_t) = 1 + (1 - 2q_t)\left(\hat{\tau}_t^j(q_t) - \hat{\tau}_t^f(q_t)\right) + (1 - q_t)q_t\left[\frac{\partial\hat{\tau}^j(q_t)}{\partial q_t} - \frac{\partial\hat{\tau}^f(q_t)}{\partial q_t}\right]$$

substituting $\partial\hat{\tau}_t^j(q_t)/\partial q_t$ and $\partial\hat{\tau}_t^f(q_t)/\partial q_t$, from (15) and (16), and after some calculations we get

$$F'(q_t) = 1 + (1 - 2q_t)\left[k(1 - q_t)\Delta V^j(\cdot) - kq_t\Delta V^f(\cdot)\right] - q_t(1 - q_t)\left[k\Delta V^j(\cdot) + k\Delta V^f(\cdot)\right]$$

Evaluating $F'(q_t)$ in $q_s = 0$, $q_s = 1$, we obtain

$$F'(0) = 1 + k\Delta V^j(\cdot)$$
$$F'(1) = 1 + k\Delta V^f(\cdot)$$

Given that $k\Delta V^j(\cdot) > 0$ and $\Delta V^f(\cdot) > 0$, then $F'(0) > 1$ and $F'(1) > 1$.

Let us turn to the global stability of $\overline{q}_s$. Define $q_A' < q^c$, such that $F_A(q_A') = q^c$, and $q_B' < q^c$, such that $F_B(q_B') = q^c$. In general, for any particular values of the parameters, $q_B' > q_A'$ (just compare the equation A and B, recalling that $\alpha w_1 > (\underline{w}_2 - \overline{w}_2)$). The existence and uniqueness of q_A' and q_B' are shown below.

We first prove that for all $q_0 \in (0, 1)$ there is a perfect foresight path of distribution of preferences that converges to the steady state $\overline{q}_s$.

Assume $q_t < q_A'$ and women expect σ^D, then $\tau_t^j(q_t, \sigma^D) > \hat{\tau}_t^f(q_t, \sigma^D)$ for all $q_t < q_A'$. Therefore, $q_{t+1} < q^c$ (by definition of q_B') and the expectation is self-confirmed (i.e. firms follow σ^D).

Assume $q_t \geq q_A'$ and women expect σ^{ND}, $\hat{\tau}_t^j(q_t, \sigma^{ND}) \gtrless \hat{\tau}_t^f(q_t, \sigma^{ND})$ for all $q_t \gtrless \overline{q}_s$ Therefore, $q_{t+1} \geq q^c$ and the expectation is self-confirmed.

Evaluating $F'(q)$ at $q_s^* \in \{\underline{q}_s, \overline{q}_s\}$ we obtain $F'(q_s^*) = 1 - \hat{\tau}$; given that $\hat{\tau}^j, \hat{\tau}^f \in (0, 1)$, then $F'(q_s^*) \in (0, 1)$. Given that the function $F(q)$ is a polynomial of third degree, $F'(0) > 1$, $F'(1) > 1$ and $F'(q_s^*) \in (0, 1)$, there are two possible situations. Firstly, a sufficient condition is that $F_A'(q_t) > 0$ and $F_B'(q_t) > 0$ for all $q_t \in (0, 1)$. When $c(\tau)$ is convex enough the above condition holds. Alternately, if $F_A(q_t)$ and $F_B(q_t)$ has interior maximum and minimum, $F'(q_s^*) \in (0, 1)$ implies that q_s^* cannot be within the maximum and the minimum. That is, q_s^* is either before the maximum or after the minimum. In both cases, we obtain global stability.

Finally, let us turn back to the existence and uniqueness of q_A' and q_B'. Notice that $F_B'(q_t) > 0$ for all $q_t \in (0, 1)$, $F_B(q^c) > q^c$ and $F_B(0) = 0$ implies that there exists a unique $q_B' \in (0, q^c)$ such that $F_B(q_B') = q^c$. A similar argument applies for q_A'. □

Appendix 2

Proof of Proposition 2

Notice that as $\overline{q}_s < q^c$ (and $\overline{q}_s > \underline{q}_s$) then $\overline{q}_s$ cannot be a rest point of the two-branch dynamics (equation A and B) because for all $q_t < q^c$, equation B holds. Therefore, the dynamics has three rest points: $q_s = 0$, $q_s = 1$ and $q_s = \underline{q}_s$. Following the same arguments as in the proof of Proposition 1, it is easy to check that $q_s = 0$, and $q_s = 1$ are unstable.

Next we prove the global stability of $\underline{q}_s$. Define $q_A' > q^c$, such that $F_A(q_A') = q^c$, and $q_B' > q^c$, such that $F_B(q_B') = q^c$. In general, for any particular values of the parameters, we have that $q_B' > q_A'$. (The existence and uniqueness of q_A' and q_B' can be proved following the argument of Proposition 1.)

We first show that for all $q_0 \in (0, 1)$ there is a perfect foresight path of distribution of preferences that converges to the steady state $\underline{q}_s$.

Assume $q_t > q_B'$ and women expect σ^{ND}, then $\hat{\tau}_t^f(q_t, \sigma^{ND}) > \hat{\tau}_t^j(q_t, \sigma^{ND})$ for all $q_t > q_B'$. But as $q_{t+1} > q^c$ (by definition of q_A') the expectation is self-confirmed.

Assume $q_t \leq q_B'$ and women expect σ^D, then $\hat{\tau}_t^j(q_t, \sigma^D) \gtrless \hat{\tau}_t^f(q_t, \sigma^D)$ for all $q_t \lesseqgtr \underline{q}_s$. But, as $q_{t+1} \leq q^c$ the expectation is self-confirmed.

Given that $F(q)$ is a polynomial of third degree, $F'(0) > 1$, $F'(1) > 1$ and $F'(q_s^*) \in (0, 1)$, there exists global stability. The argument is the same of Proposition 1. □

Appendix 3

Proof of Proposition 3

It is straight forward to show that $q_s = 0$, and $q_s = 1$ are unstable, following the same arguments as in the proof of Proposition 1.

Let us first construct the two perfect foresight paths of preferences which exist for any $q_0 \in [q_A', q_B']$.

For any $q_t \in [q'_A, q'_B]$ and women expecting σ^D, the socialization efforts are such that $\hat{\tau}^j_t(q_t, \sigma^D) \gtrless \hat{\tau}^f_t(q_t, \sigma^D)$ for all $q_t \lesseqgtr \overline{q}_s$. But, as $q_{t+1} \leq q^c$, because $q_t \leq q'_B$, the expectation are self-confirmed. The path of preferences converges to $\underline{q}_s$. Global stability is satisfied because of the usual assumption on the convexity of $c(\cdot)$.

Next, for any $q_t \in [q'_A, q'_B]$ and women expecting σ^{ND}, the socialization efforts are such that $\hat{\tau}^j_t(q_t, \sigma^{ND}) \gtrless \hat{\tau}^f_t(q_t, \sigma^{ND})$ for all $q_t \lesseqgtr \overline{q}_s$. But, as $q_{t+1} \geqslant q^c$, because $q_t \geq q'_A$, the expectation are self-confirmed. This path of preferences converges to $\overline{q}_s$. The global stability can be proved as before with the assumption on the convexity of $c(\cdot)$.

Now, let us analyze item (ii) of the Proposition. Firstly, assume that $q'_A \geq \underline{q}_s$. Thus, for all $q_t \in (0, q'_A)$ and if women expect σ^D, $\hat{\tau}^j_t(q_t, \sigma^D) \gtrless \hat{\tau}^f_t(q_t, \sigma^D)$ for all $q_t \lesseqgtr \overline{q}_s$. But, as $q_{t-1} < q^c$ by definition of q'_B (with $q'_B > q'_A$) the expectation is self-confirmed. This path of preferences converges to $\underline{q}_s$. Secondly, assume $\overline{q}'_A < \underline{q}_s$. In this case, there are two perfect foresight paths of preferences. In the first one women expect σ^D, so that $\hat{\tau}^j_t(q_t, \sigma^D) > \hat{\tau}^f_t(q_t, \sigma^D)$ and $\underline{q}_s$ is eventually reached. But, in the other perfect foresight path, initially women expect σ^D and $\hat{\tau}^j_t(q_t, \sigma^D) > \hat{\tau}^f_t(q_t, \sigma^D)$, but when the dynamic reaches a distribution $q_t \in [q'_A, \underline{q}_s)$ there is a shift in expectation: women expect σ^{ND}. From there on, as we showed in item (i), there is a perfect foresight continuation path which converges to $\overline{q}_s$.

A similar argument proves item (iii) of the Proposition. □