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FEMALE EDUCATION AND EMPLOYMENT: A WASTE OF TALENT

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Female Education and Employment: A Waste of Talent*

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Abstract

Why are there women who invest in education but do not participate in the labour market? What are the macroeconomic implications of their absence from the labour market? Why do different countries show different performances in terms of education and participation? We propose an explanation whose main ingredients are the heterogeneity of individuals with respect to the child care costs they bear, the asymmetric information along this dimension and the endogeneity of the education decision. We then study whether there are policies which can support education and participation decisions. In a general equilibrium OLG growth model we show that there is a number of women who have invested in education and find it profitable not to enter the labour market after giving birth to a baby. Their non-participation generates a waste of talent, since the effective output is lower than the potential one as determined by human capital investment. We determine the growth rate of human capital and output and analyse how they depend on the institutional and cultural environment. As a characterisation of the istitutional environment we study a tax-trasfer scheme that can support the education and participation decision and analyse its emergence in a political game. We show that this policy has positive repercussions on growth.

Keywords: child care costs, asymmetric information, growth, tax-transfer scheme, majority voting.

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1 Introduction

Industrialised countries are characterised by large cross-country differences in terms of female participation and employment rates. The same can be said if one focuses on education and looks at the shares of women with tertiary education. As Table 1 shows, while in Italy only 12,73% of women in the 25-64 cohort acquire tertiary education, in Denmark they are more than 35%. The pattern does not change if we focus on younger cohorts. Not only are there differences in terms of the share of educated women,- but also in terms of the percentages of educated women who work. Among the educated, 75% of Italian women works, while more than 86% of women works in countries such as Iceland, Norway and Sweden.

If we compare males and females, while the gender gap in educational attainment is almost closed, if not overturned, in many European countries, the gender gap in labour market participation still remains significant, even if we concentrate only on workers with tertiary education, indicating that the waste of human capital among females is the largest.

Figure 1 and 2 suggest that countries where the number of educated women and the percentages of educated women who work are higher are those where public subsidies to home produced goods (child care for instance) are larger, or where measures of flexibility on the labor market are more used (part-time for instance).[1] Scandinavian countries are an example. These are also the countries where the attitudes to female work on the market are the most positive. In Figure 1c and 2c we build an index of gender culture based on data from the World Value Survey (1999)[2] to measure the attitudes of individuals towards

[1] In Figure 1a we plot the share of female with tertiary education and the availability of part-time jobs, both based on Eurostat data. In Figure 1b we plot the share of female with tertiary education and the final child care score for children of age 0-2 taken from De Henau et al. (2007). In Figure 2a and 2b on the vertical axis we have the share of educated women who are employed instead of the share of educated women.

[2] The culture index for each country is obtained considering the answers to the following 3 questions asked by the WVS (1999): "When jobs are scarce, men should have more right to a job than women

female work on the market. In countries where our index of gender culture is higher, people are more favourable to female employment, and the share of women with tertiary education as well as the employment of the educated women are higher.

Previous contributions have studied the impact of cross-country differences in institutions on the female labour market participation and on the fertility decision (see Del Boca et al. (2007) and De Henau et al. (2007) for instance). The relationship between institutions and educational choices is instead less explored. By the same token, Fernandez (2007) and Fernandez and Fogli (2007) for instance study the role of culture on female employment and fertility, while less attention has been devoted to the influence that cultural variables may have on the human capital investment decision.

Including educational choices into the analysis of female employment is however essential to shed a light on the unused human capital of educated women who do not work and to analyse what can be done to gain these potential resources.

Why are there women who invest in education but do not participate in the labor market? What are the implications for growth of their absence from the labour market? Why are there cross-country differences in the number of educated women? Why do different countries show different performances in terms of education and participation?

We propose an explanation whose main ingredients are the heterogeneity of individuals with respect to the child care costs they bear, the asymmetric information along this dimension and the endogeneity of the education decision. Child care costs depend both on individual characteristics and on the institutional or cultural environment where the woman lives. Some women may bear a higher individual cost than others, i.e. a higher

(C001)"; "A working mother can establish just as a warm and secure relationship with her children as a mother who does not work (D056)" and "Being housewife is just as fulfilling as working for a pay (D057)". For the first statement, we assign a value of 1 to people who agree and a value of 2 to people who disagree. For the second and third statement, we assign a value of 1 to people who agree strongly, 2 to people who agree, 3 to people who disagree and 4 to people who strongly disagree. We then divide the sum so obtained for each question by the number of answers given in order to have an average score. The index is finally obtained summing the average score for the first and third question and subtracting the score for the second question, so that a higher value of the index indicates a higher acceptance of female employment, i.e. a higher gender culture.

amount of required homecare, for instance because they have more children, or they cannot count on the partner or on family networks to take care of them. Women living in certain areas may face a more favourable institutional environment, for instance because the legislation provides instruments for work-life balance and for a flexible labour market, incentives to the support from the partner, premia to the firms which promote women, or because public or private day care services are available. They may also live in a cultural environment where female market work is promoted, accepted or at least not opposed.

We build a two-period general equilibrium overlapping generations model with endogenous growth. Women are heterogeneous in talent and in child care costs. While they know their talent, their child care cost is fully revealed only after the child birth. Based on their expectations on the child care cost, in the first period they decide how much time to devote to human capital accumulation. In the second period, they give birth to a child, their true cost is revealed and they decide whether to work or not.

We identify a threshold level of ability such that only women whose ability is above such threshold find it convenient to invest in education. This cut-off is increasing in the average child care cost. We show that, after the child birth, there is a number of women who have invested in education who find it profitable not to enter the labour market, knowing they are high-cost type. We discuss the role that the institutional and cultural environment have on the number of educated women and on the likelihood of their participation.

The decision not to participate to the labour market has macroeconomic implications: effective output is lower than the potential one as determined by human capital investment and so is the growth rate. We finally study a tax-transfer scheme targeted to educated and working women and show that its implementation has positive repercussions on education, participation and growth. We show under what conditions this scheme can emerge as the equilibrium of a majoritarian voting game.

Our contribution is related to a recent growing literature which studies how gender inequality in the labour market can arise in equilibrium through self-fulfilling expectations, even when the distribution of ability between men and women is the same (Francois, 1998; Albanesi and Olivetti, 2006; Bjerk and Hahn, 2007, Lommerud and Vagstad, 2007).

These contributions share a common assumption, namely, skills are given and cannot be accumulated. Our attention here is instead on the female education and participation decisions and on their impact on growth.

Many previous contributions have analyzed the role of human capital as a fundamental engine for growth (see the seminal contribution by Lucas, 1988 and Glomm and Ravikumar, 1992). More recent literature has focused on the negative effects for growth deriving from a misallocation of individuals in jobs, which may arise when social mobility is low. In Galor and Tsiddon (1997) and Hassler and Mora (2000) technological changes may increase social mobility, and thus growth. Bernasconi and Profeta (2007) consider instead the role of public education: when high-talented individuals coming from poor families are allocated in bad jobs there is a waste of human capital which is detrimental for growth. Public education may contribute to reducing this mismatch, thus increasing social mobility and growth. Though our analysis shows some similarities with these previous arguments, none of them has identified as a waste of talent the fact that some educated women do not work.

(TO BE INCLUDED: references to the literature on child care provision)

The paper is organised as follows: the next Section develops the model, Section 3 analyzes the macroeconomic implications of the individual education and participation decisions under asymmetric information and Section 4 concludes. Proofs are in the Appendix.

2 The model

2.1 General features

We develop a two-period general equilibrium overlapping generations model with endogenous growth. Women are heterogeneous in talent and in child care costs. These costs depend both on individual characteristics ρ and on the institutional and cultural environment I where the woman lives. Some women may bear a higher cost ρ than others, i.e. a higher amount of required homecare. They may also live in a more favourable environment I, in terms of institutions or cultural attitudes of the society. Formally, $g(\rho, I)$ indicates the child care cost, with partial derivatives $g_{\rho}(\rho, I) > 0$, $g_I(\rho, I) < 0$. We assume that information about this cost is imperfect: while I is common knowledge, ρ is not known either to women or to the firm until the child birth. For tractability, we assume that $g(\rho, I) = \frac{\rho}{I}$ and that ρ can take only two values $\rho^H < 1$ with probability π and $\rho^L < 1$ with probability $(1-\pi)$, where $\rho^H > \rho^L$. π is known both to women and to firms. As to talent e^i, it is distributed on the interval $[0, 1]$ with continuous density function $f(\cdot)$ and it is known to women and firms.

In their first period of life, women decide how much time to devote to human capital accumulation and how much time to spend in leisure. While women know their talent when deciding their investment in human capital, they form expectations on ρ. In the second period, women give birth to a child and they discover their true type. Those who invested in human capital enter the labor market and work if they are low-cost types. The high-cost types decide whether to work or not. Those who did not invest in human capital do not enter the labour market and live out of their initial endowment $\widehat{w}_{t+1}$, which is by assumption the same for everybody. Consumption takes place only at the end of the second period of life when agents consume all their lifetime income. The population growth rate is zero.

Firms operate in a perfectly competitive environment and randomly meet workers at the beginning of the second period when the match takes place.

2.2 Individual problem

Women decide whether to invest in skill acquisition and work or whether to remain unskilled and out of the labour market comparing their expected indirect utility function in the two cases. The objective function of agent i is:

$$EU_t^i = \pi c_{t+1}^{iH} + (1-\pi)c_{t+1}^{iL} - (1-n_t^i)^{\alpha} \tag{1}$$

where c_{t+1}^{iH} and $c_{t+1}^{iL}$are the consumption during the second period of life when agent i is characterised by ρ^H and ρ^L respectively , n_t^i is leisure and $\alpha > 1$. When agent i works, the budget constraints are:

$$c_{t+1}^{iH} = \left(w_{t+1}^i + \widehat{w}_{t+1}\right)(1 - \frac{\rho^H}{I}) \tag{2}$$

$$c_{t+1}^{iL} = \left(w_{t+1}^{i} + \widehat{w}_{t+1}\right)(1 - \frac{\rho^{L}}{I}) \tag{3}$$

where w_{t+1}^{i} is the wage paid to agent i by the competitive firm. Output per worker is:

$$y_{t+1}^{i} = h_{t+1}^{i} \tag{4}$$

with h_{t+1}^{i} denoting the individual level of human capital.

Profit maximisation by the competitive firms will deliver $w_{t+1}^{i} = h_{t+1}^{i}$. $\widehat{w}_{t+1}$ is a family endowment equal for everybody.[3] To capture that in a dynamic context the family endowment can vary over time, we assume that $\widehat{w}_{t+1}$ is a function of the average level of human capital in the entire economy (including therefore men and women). We rewrite the latter as a linear transformation of the female average level of human capital $\overline{h}_{t+1}$, i.e. we set $\widehat{w}_{t+1} = \nu\overline{h}_{t+1}$, with $\nu > 0$.

Human capital accumulates according to the following Cobb-Douglas technology:

$$h_{t+1}^{i} = \vartheta\overline{h_{t}}^{\delta} e^{i\gamma}(1 - n_{t}^{i})^{\beta} \tag{5}$$

where ϑ is a scale parameter, $\overline{h_t}$ is the average level of human capital of the previous generation, and δ, γ and $\beta \in (0,1)$ are the parameters of the human capital production function.

When they do not work, women do not accumulate human capital, $n_{t}^{i} = 0$ and the budget constraints are:

$$c_{t+1}^{H} = \widehat{w}_{t+1}\left[1 - (\frac{\rho^{H}}{I} - \eta)\right] \tag{6}$$

$$c_{t+1}^{L} = \widehat{w}_{t+1}\left[1 - (\frac{\rho^{L}}{I} - \eta)\right] \tag{7}$$

where η indicates a reduction of child care cost for non-working mothers,[4] implying that

[3] Assuming that $\widehat{w}_{t+1}$ is the same for everybody implies that investing in education does not increase, for instance, the probability of having a partner with higher income and therefore of having a higher family endowment. In a context where the marriage market is explicitly analysed, our assumption would be consistent with the idea that there is no assortative mating. Introducing assortative mating would increase the returns and therefore the incentives to invest in education, without altering the main insights of the paper.

[4] See Bjerk and Hahn (2007) for a similar assumption. Notice that our results would hold also under the assumption that non-working women do not experience any child care cost, $c_{t+1}^{H} = c_{t+1}^{L} = \widehat{w}_{t+1}$.

child care is mostly home provided when a woman is out of the labour market and that in-home provision of child care is cheaper.

Women choose the amount of human capital investment maximising equation (1), subject to (2) and (3). The optimal level of investment in human capital for women of talent e^i is given by:

$$1 - n_t^i = \left[\frac{\beta}{\alpha}\vartheta\overline{h_t}^{\delta} e^{i\gamma}(1 - \frac{\overline{\rho}}{I})\right]^{\frac{1}{\alpha-\beta}} \tag{8}$$

where $\frac{\overline{\rho}}{I} = \pi\frac{\rho^H}{I} + (1-\pi)\frac{\rho^L}{I}$ is the average child care cost and where we assume $\alpha > \beta$ to guarantee that talent and education are positively related.

The indirect utility function of educated and non-educated women are, respectively:

$$\begin{aligned} U_{t,n<1}^i &= \left\{\vartheta\overline{h_t}^{\delta} e^{i\gamma}\left[\frac{\beta}{\alpha}\vartheta\overline{h_t}^{\delta} e^{i\gamma}(1-\frac{\overline{\rho}}{I})\right]^{\frac{\beta}{\alpha-\beta}} + \widehat{w}_{t+1}\right\}(1-\frac{\overline{\rho}}{I}) + \\ &\quad - \left[\frac{\beta}{\alpha}\vartheta\overline{h_t}^{\delta} e^{i\gamma}(1-\frac{\overline{\rho}}{I})\right]^{\frac{\alpha}{\alpha-\beta}} \end{aligned} \tag{9}$$

$$U_{t,n=1}^i = \widehat{w}_{t+1}\left[1 - (\frac{\overline{\rho}}{I} - \eta)\right] \tag{10}$$

Comparing (9) and (10), we identify the following threshold level Ψ_t of innate talent such that women with $e^i \geq \Psi_t$ invest in education and work:

$$\Psi_t \equiv \frac{(\widehat{w}_{t+1}\eta)^{\frac{\alpha-\beta}{\alpha\gamma}}}{\left\{\vartheta\overline{h_t}^{\delta}\left[\frac{\beta}{\alpha}\vartheta\overline{h_t}^{\delta}(1-\frac{\overline{\rho}}{I})\right]^{\frac{\beta}{\alpha-\beta}}\left(1-\frac{\overline{\rho}}{I}\right)(1-\frac{\beta}{\alpha})\right\}^{\frac{\alpha-\beta}{\alpha\gamma}}} \tag{11}$$

It follows immediately that $\frac{\partial\Psi_t}{\partial\overline{\rho}} > 0$ and $\frac{\partial\Psi_t}{\partial I} < 0$. When the child care cost is higher, either because the average individual cost is higher or the institutional/cultural environment is less favourable, fewer women invest in education and work.

At the beginning of the second period of life, all women give birth to a child and they discover their true-cost type. If they are high-cost type $\rho^H > \overline{\rho}$, they reconsider whether to work or not.[5] Recalling that the investment in education is sunk, women compare the

[5]As to those who discover to be low-cost type, if they invested, their incentive to participate is not affected by the revelation of their own true type. If they did not invest, they did not accumulate any human capital, as equation (5) shows, and therefore they never have access to the labour market. This assumption can be relaxed by modifying the human capital technology and endowing people of a minimum

utility they can enjoy in the second period of life in the case they work $U_{t+1,l=1}$ or in the case they do not participate $U_{t+1,l=0}$. Namely, simplifying terms, high-cost women will work when:

$$(h^i_{t+1} + \widehat{w}_{t+1})(1 - \frac{\rho^H}{I}) > \widehat{w}_{t+1}(1 - \frac{\rho^H}{I} + \eta) \tag{12}$$

Following the same procedure as before, we can identify a new threshold level of ability Ψ'_{t+1} such that only high-cost women whose ability $e^i \geq \Psi'_{t+1}$ do indeed work, with:

$$\Psi'_{t+1} \equiv \frac{(\widehat{w}_{t+1}\eta)^{\frac{\alpha-\beta}{\alpha\gamma}}}{\left\{\vartheta\overline{h_t}^{\delta}\left[\frac{\beta}{\alpha}\vartheta\overline{h_t}^{\delta}(1-\frac{\overline{\rho}}{I})\right]^{\frac{\beta}{\alpha-\beta}}\left(1-\frac{\rho^H}{I}\right)\right\}^{\frac{\alpha-\beta}{\alpha\gamma}}} \tag{13}$$

Again, it follows straightforwardly that $\frac{\partial\Psi'_{t+1}}{\partial\rho^H} > 0$ and that $\frac{\partial\Psi'_{t+1}}{\partial I} < 0$. When the child care cost is higher, either because the individual cost ρ^H is higher or the institutional and cultural environment is less favourable, the level of ability for which women of type ρ^H find it convenient to work goes up. When $\Psi'_{t+1} \geq \Psi_t$, a share of educated women find it convenient not to work after the child birth. This happens when the following condition is satisfied:

$$\Psi'_{t+1} \geq \Psi_t \text{ if } \frac{\rho^H}{I} - \frac{\overline{\rho}}{I}(1 - \frac{\beta}{\alpha}) \geq \frac{\beta}{\alpha} \tag{14}$$

If the above condition is satisfied, the number of educated women who do not participate to the labour market at time $t+1$ is:

$$Q_{t+1} = \pi\left[F(\Psi'_{t+1}) - F(\Psi_t)\right] \tag{15}$$

Remark 1 *A more favourable institutional or cultural environment reduces the likelihood of observing educated women who do not participate to the labour market. Indeed, ceteris paribus, an increase in I makes it more difficult to satisfy (14).*

In the rest of the paper we concentrate on the case where $Q_{t+1} > 0$, which is the focus of our interest.

Notice that the nonparticipation of high-cost educated women is generated by asymmetric information. While asymmetric information cannot be completely eliminated, its

level of human capital to be used in the labour market even in the absence of an explicit investment. Also in this case, the main insights of the paper would not be altered.

impact can be attenuated by stronger institutions or more favourable attitudes. Indeed, when I is large, the differences between being a high-type and being a low-type become irrelevant and therefore all women who have invested in education do indeed work after the child birth. In other words, a level of I not large enough can be interpreted as the real responsible for non participation.[6] However, institutions are not exogenous (add references). In Section 4 we represent I through a tax-transfer scheme and study how it affects the education and participation decision. We then analyse whether a scheme of this type can be the equilibrium of a politico-economic game.

3 The macroeconomy

In this Section we analyse the macroeconomic implications of the non participation of educated women.[7]

Aggregate human capital formed at t is:

$$H_t = \int_{\Psi_t}^{1} h_t f(e) de \tag{16}$$

Aggregate output at $t+1$ is given by

$$Y_{t+1} = (1-\pi) \int_{\Psi_t}^{1} h_t f(e) de + \pi \int_{\Psi'_{t+1}}^{1} h_t f(e) de \tag{17}$$

[6] As it should be clear, we have abstracted from the explicit modelling of the male education and work decision. If male decisions were to be introduced, we would consider a context where, for given institutional environment, men are homogeneous with respect to the child care cost ρ^M which enters both their education and participation decision. This implies that there are not any educated men who would decide not to participate due to the child care costs, differently from women. This is in line with the evidence that male labour supply is less elastic than female and with the data offered in Column 5 and 6, Table 1. The comparison between the female and male education levels would depend, among other things, on the relationship between ρ^M and $\overline{\rho}$. When they are close, male and female take the same education decision, other things constant (See column 1 and 2 of Table 1). This does not imply that they have the same behaviour on the labour market as, at the child birth, the ex ante asymmetric information for women counts.

[7] Notice that we are here focusing on the contributions that only women give to aggregate human capital and output.

We define the loss L_{t+1} which the economy experiences at $t+1$ as the difference between the human capital accumulated and output produced,[8] as a share of aggregate human capital:

$$L_{t+1} = \frac{H_t - Y_{t+1}}{H_t} \tag{18}$$

It measures the reduction in potential output which an economy suffers when educated women do not work.[9]. Using (16) and (17), simple algebra delivers the following expression for the loss:

$$L_{t+1} = \frac{\pi \int_{\Psi_t}^{\Psi'_{t+1}} h_t f(e) de}{\int_{\Psi_t}^{1} h_t f(e) de} \tag{19}$$

3.1 The dynamics

We here make the simplifying assumption that agents are homogeneous with respect to their talent. In this case, (16) and (17) can be rewritten as follows:

$$H_t = [1 - F(\Psi_t)] h_t \tag{20}$$

$$Y_{t+1} = \left\{1 - F(\Psi_t) - \pi[F(\Psi'_{t+1}) - F(\Psi_t)]\right\} h_t \tag{21}$$

How H_t and Y_{t+1} evolve over time depend on the behaviour of Ψ_t, Ψ'_{t+1} and h_t. Starting from the latter and plugging (8) into (5), the rule of accumulation of per capita human capital is:

$$h_{t+1} = A h_t^{\frac{\alpha\delta}{\alpha-\beta}} \tag{22}$$

where $A = \left[\frac{\beta}{\alpha}(1 - \frac{\bar{p}}{I})\right]^{\frac{\beta}{\alpha-\beta}} \vartheta^{\frac{\alpha}{\alpha-\beta}} e^{\frac{\alpha\gamma}{\alpha-\beta}} > 0$ is a constant. Notice, in particular, that $A = A(I)$, with $\frac{\partial A(I)}{\partial I} > 0$.

[8] We recall that unskilled workers, i.e. those who did not invest in human capital, are not producing any output in our framework.

[9] We are not explicitly accounting for the benefits that human capital investment provides when not employed on the market. This is not to say that human capital investments by mothers do not have positive effects on the economy (for instance through private benefits to children or through externalities to the society as a whole). However, as long as working on the market does not completely crowd out these effects, there are further benefits (or lower losses) to be reaped when educated women work on the market.

Starting from the value of the threshold Ψ_t as given by equation (11), we substitute in the numerator $\widehat{w}_{t+1} = \nu\overline{h}_{t+1} = \nu A\overline{h}_t^{\frac{\alpha\delta}{\alpha-\beta}}$ and we rewrite:

$$\Psi_t = \frac{(\eta\nu A)^{\frac{\alpha-\beta}{\alpha\gamma}}}{\vartheta^{\frac{1}{\gamma}}(\frac{\beta}{\alpha})^{\frac{\beta}{\alpha\gamma}}(1-\frac{\overline{\rho}}{I})^{\frac{1}{\gamma}}(1-\frac{\beta}{\alpha})^{\frac{\alpha-\beta}{\alpha\gamma}}} \tag{23}$$

As to Ψ'_{t+1}, using (13) and (22), we obtain:

$$\Psi'_{t+1} = \frac{(\eta\nu A)^{\frac{\alpha-\beta}{\alpha\gamma}}}{\vartheta^{\frac{1}{\gamma}}(\frac{\beta}{\alpha})^{\frac{\beta}{\alpha\gamma}}(1-\frac{\overline{\rho}}{I})^{\frac{\beta}{\alpha\gamma}}(1-\frac{\rho^H}{I})^{\frac{\alpha-\beta}{\alpha\gamma}}} \tag{24}$$

Notice that (23) and (24) do not depend on $h_t = \overline{h}_t$.

Given (23) and (24), the thresholds are constant ($\Psi_t = \Psi_{t+1} = \Psi$ and $\Psi'_t = \Psi'_{t+1} = \Psi'$).

The number of educated women who do not participate to the labor market is constant. Thus, human capital and output grows at the same rate. The growth rates of aggregate human capital $g_H = \frac{H_{t+1}}{H_t}$ and output $g_Y = \frac{Y_{t+1}}{Y_t}$ in equations (20) and (21) are entirely determined by the growth rate of per capita human capital $g_h = \frac{h_{t+1}}{h_t}$ with, using (22):

$$g_h = g_H = g_Y = g = Ah_t^{\frac{\alpha\delta}{\alpha-\beta}-1} \tag{25}$$

Proposition 2 *(i) If $\frac{\alpha\delta}{\alpha-\beta} \neq 1$, then there exists a unique steady state given by $h_s > 0$ such that $h_{t+1} = h_s$ whenever $h_t = h_s$; (ii) If $\frac{\alpha\delta}{\alpha-\beta} = 1$ and $A(I) \neq 1$ then there does not exist a steady state.*
The long run growth rates are characterized as follows: (i) If $\frac{\alpha\delta}{\alpha-\beta} < 1$, then $\lim_{t\to\infty} h_{t+1}/h_t = 1$; (ii) If $\frac{\alpha\delta}{\alpha-\beta} > 1$, then h_{t+1}/h_t is greater than 1 and increasing over time if the initial level of human capital h_0 is such that $h_0 > h_s$; (ii) If $\frac{\alpha\delta}{\alpha-\beta} = 1$, then there is endogenous growth and $g = h_{t+1}/h_t = A(I)$.

Notice that $\frac{\alpha\delta}{\alpha-\beta}$ is the key parameter that determines growth in our model. That the parameter of the Cobb-Douglas human capital technology are crucial to characterize the growth rates is standard in the literature (see Glomm and Ravikumar). In particular, we find that when $\frac{\alpha\delta}{\alpha-\beta} < 1$ (decreasing returns) the steady state is globally stable and independent on the initial stock of human capital. In this case the long-run growth rate is zero. When $\frac{\alpha\delta}{\alpha-\beta} > 1$ (increasing returns) the steady state is unstable and we have unbounded growth depending on the initial conditions. Finally, when $\frac{\alpha\delta}{\alpha-\beta} = 1$ (constant returns) the growth rate is constant and its level depends on I, as stated in the following corollary.

Corollary 3 *Economies with more favourable cultural and institutional environments are characterised by higher growth rates.*

Proof. It follows straightforwardly from $\frac{\partial A(I)}{\partial I} > 0$. ■

Finally, we focus on the dynamics of the loss L_{t+1} identified before. Using (16) and (21), from equation (19), it is straightforward to see that:

$$\frac{L_{t+1}}{L_t} = 1 \tag{26}$$

i.e. the amount of human capital which does not transform into output (as a share of aggregate human capital) is constant over time and it does not cancel out as the economy grows. For the case when there is endogenous growth we can describe the impact of institutions and culture on the loss as follows.

Corollary 4 *If $\delta = \gamma$ and f is uniform on the interval $[0, 1]$, economies with more favourable cultural and institutional environments are characterised by lower losses of human capital investment.*

Proof. See Appendix (part A). ■

4 The tax-transfer scheme

In this section we represent institutions as a tax-trasfer scheme and we study its role in affecting the education and participation decision. I will still capture cultural attitudes. The scheme we analyse requires the payment of proportional contributions τ levied on wages and on family endowments of the entire population. The benefits are paid out to working women as a proportional discount φ on the cost of child care bought on the market. The budget constraint of the scheme is as follows:

$$\tau\left[\pi\int_{\Psi'_{t+1}}^{1} w_{t+1}^{i} f(e)de + (1-\pi)\int_{\Psi_t}^{1} w_{t+1}^{i} f(e)de + \widehat{w}_{t+1}\int_{0}^{1} f(e)de\right] \tag{27}$$

$$= \pi\varphi\frac{\rho^H}{I}\left[\int_{\Psi'_{t+1}}^{1} w_{t+1}^{i} f(e)de + \widehat{w}_{t+1}\int_{\Psi'_{t+1}}^{1} f(e)de\right] + (1-\pi)\varphi\frac{\rho^L}{I}\left[\int_{\Psi_t}^{1} w_{t+1}^{i} f(e)de + \widehat{w}_{t+1}\int_{\Psi_t}^{1} f(e)de\right] \tag{28}$$

where we recall that $w_{t+1}^{i} = h_{t+1}^{i}$. The budget constraints of the individual problem change as follows: when agent i invests and works, the budget constraints are:

$$c_{t+1}^{iH} = \left(w_{t+1}^{i} + \widehat{w}_{t+1}\right)\left(1 - \frac{\rho^H}{I}(1-\varphi) - \tau\right) \tag{29}$$

$$c_{t+1}^{iL} = \left(w_{t+1}^{i} + \widehat{w}_{t+1}\right)\left(1 - \frac{\rho^L}{I}(1-\varphi) - \tau\right) \tag{30}$$

Women who do not work do not accumulate human capital, $n_t^i = 0$ and the budget constraints are:

$$c_{t+1}^{H} = \widehat{w}_{t+1}\left[1 - \frac{\rho^H}{I} + \eta - \tau\right] \tag{31}$$

$$c_{t+1}^{L} = \widehat{w}_{t+1}\left[1 - \frac{\rho^L}{I} + \eta - \tau\right] \tag{32}$$

that is, they contribute to the scheme without being entitled to receving any benefit.

In order to see how the tax-transfer scheme affects the decision to invest in education and to work, we calculate the new indirect utility functions in the two cases. Equation (9) and (10) can be rewritten as follows:

$$U_{t,n<1}^{i} = \left\{\vartheta\overline{h_t}^{\delta} e^{i\gamma}\left[\frac{\beta}{\alpha}\vartheta\overline{h_t}^{\delta} e^{i\gamma}\left(1-\frac{\overline{\rho}}{I}(1-\varphi)-\tau\right)\right]^{\frac{\beta}{\alpha-\beta}} + \widehat{w}_{t+1}\right\}\left(1-\frac{\overline{\rho}}{I}(1-\varphi)-\tau\right) - \left[\frac{\beta}{\alpha}\vartheta\overline{h_t}^{\delta} e^{i\gamma}\left(1-\frac{\overline{\rho}}{I}(1-\varphi)-\tau\right)\right]^{\frac{\alpha}{\alpha-\beta}} \tag{33}$$

$$U_{t,n=1}^{i} = \widehat{w}_{t+1}\left(1-\frac{\overline{\rho}}{I}+\eta-\tau\right) \tag{34}$$

The new threshold level of ability such that women find it profitable to invest is

$$\Psi_t^{\tau} \equiv \frac{\left[\widehat{w}_{t+1}(\eta-\varphi\frac{\overline{\rho}}{I})\right]^{\frac{\alpha-\beta}{\alpha\gamma}}}{\left\{\vartheta\overline{h_t}^{\delta}\left[\frac{\beta}{\alpha}\vartheta\overline{h_t}^{\delta}\left(1-\frac{\overline{\rho}}{I}(1-\varphi)-\tau\right)\right]^{\frac{\beta}{\alpha-\beta}}\left(1-\frac{\overline{\rho}}{I}(1-\varphi)-\tau\right)(1-\frac{\beta}{\alpha})\right\}^{\frac{\alpha-\beta}{\alpha\gamma}}} \tag{35}$$

In order to establish whether the tax transfer scheme is capable of providing stronger incentives to human capital investment, we compare Ψ_t with Ψ_t^τ. The numerator in (11) is always higher than the numerator in (35). By looking at the denominators, a sufficient condition to obtain $\Psi_t > \Psi_t^\tau$ is:

$$\tau \leq \frac{\varphi\overline{\rho}}{I} \tag{36}$$

which, using the budget constraint in (27) is always satisfied (See Appendix, part B). As the threshold level of ability such that women find it convenient to invest in education is smaller if (36) is satisfied, the tax transfer system induces more people to acquire human capital. We now turn to the implications of the presence of the tax-transfer system on the decision to participate. The new threshold of ability Ψ'^{τ}_{t+1} such that only women whose ability $e^i \geq \Psi'^{\tau}_{t+1}$ do indeed work is:

$$\Psi'^{\tau}_{t+1} \equiv \frac{\left[\widehat{w}_{t+1}(\eta - \varphi\frac{\overline{\rho}}{I})\right]^{\frac{\alpha-\beta}{\alpha\gamma}}}{\left\{\vartheta\overline{h_t}^{\delta}\left[\frac{\beta}{\alpha}\vartheta\overline{h_t}^{\delta}\left(1 - \frac{\overline{\rho}}{I}(1-\varphi) - \tau\right)\right]^{\frac{\beta}{\alpha-\beta}}\left(1 - \frac{\rho^H}{I}(1-\varphi) - \tau\right)\right\}^{\frac{\alpha-\beta}{\alpha\gamma}}} \tag{37}$$

The following proposition suggests that the tax-transfer system may make it less likely that women who have invested in education decide not to participate.

Proposition 5 *If* $\frac{\beta}{\alpha} \leq \frac{\rho^H}{I} - \frac{\overline{\rho}}{I}(1-\frac{\beta}{\alpha}) \leq \frac{\beta}{\alpha}\frac{1-\tau}{1-\varphi}$ *in the economy without tax and transfers there are women who have invested in education but do not participate, while in the economy with the tax-transfer scheme all women who have invested in education work.*

Proof. Comparing Equation (35) and (37) the condition such that $\Psi'^{\tau}_{t+1} > \Psi_t^\tau$ is $\frac{\rho^H}{I} - \frac{\overline{\rho}}{I}(1-\frac{\beta}{\alpha}) > \frac{\beta}{\alpha}\frac{1-\tau}{1-\varphi}$. The result comes from $\tau < \varphi$ (from 36) and from condition (14). ∎

The increase in the number of educated women and in their participation has repercussions on the growth rate of the economy. In the presence of taxes and subsidies to working women the growth rate of the economy is

$$A^\tau = \left[\frac{\beta}{\alpha}\left(1 - \frac{\overline{\rho}}{I}(1-\varphi) - \tau\right)\right]^{\frac{\beta}{\alpha-\beta}}\vartheta^{\frac{\alpha}{\alpha-\beta}}e^{\frac{\alpha\gamma}{\alpha-\beta}} \tag{38}$$

which, using (36), is such that $A < A^\tau$, implying that the growth rate of the economy is higher when female education and work is subsidised.

4.1 Voting on τ

In this Section we study whether the tax-transfer scheme described in the previous section can be supported by a majority voting coalition. We assume that individuals vote over their preferred level of the tax rate τ in the first period of life after their education decision and before knowing their true type. We first observe that agents who do not invest in education and therefore do not work (i.e. all $e^i < \Psi$) prefer $\tau = 0$ and thus $\varphi = 0$. Agents who have invested in education (i.e. all $e^i \in (\Psi, 1)$) choose their favourite level of τ by maximising their indirect utility function (33). We have:

$$\frac{\partial U^i_{t,n<1}}{\partial \tau} = \left\{ \left(\vartheta \overline{h_t}^{\delta} e^{i\gamma}\right)^{\frac{\alpha}{\alpha-\beta}} \frac{\alpha}{\alpha-\beta} \left(1 - \frac{\overline{\rho}}{I}(1-\varphi) - \tau\right)^{\frac{\beta}{\alpha-\beta}} \frac{\beta}{\alpha}^{\frac{\beta}{\alpha-\beta}} (1 - \frac{\beta}{\alpha}) + \widehat{w}_{t+1} \right\} \left(\frac{\overline{\rho}}{I}\frac{\partial \varphi}{\partial \tau} - 1\right)$$

Given that the first term in curly brackets is always positive, the sign of $\frac{\partial U^i_{t,n<1}}{\partial \tau}$ depends on the sign of $\left(\frac{\overline{\rho}}{I}\frac{\partial \varphi}{\partial \tau} - 1\right)$. Condition 36 guarantees that preferences are single-peaked over τ. It is immediate to show that $\tau = \varphi\frac{\overline{\rho}}{I}$ is a maximum for $\frac{\partial U^i_{t,n<1}}{\partial \tau}$ for all $e^i \in (\Psi, 1)$. In this case $\frac{\partial U^i_{t,n<1}}{\partial \tau}$ increases with the level of ability e^i. In other words, the higher the ability of the individual, the higher the indirect utility that he can reach when choosing his preferred level of taxation.

Proposition 6 *The equilibrium level of taxation in a majoritarian voting game is the following. If $F(\Psi) > \frac{1}{2}$, then $\tau^* = 0$. If $F(\Psi) < \frac{1}{2}$, then $\tau^* = \varphi\frac{\overline{\rho}}{I}$.*

Our results suggest that, as long as the number of educated women is small, the tax-transfer scheme may not be supported as a politico-economic equilibrium. Society/women are trapped in a bad equilibrium: the high costs of child care bought on the market $\overline{\rho}$ relative to the cost of providing care at home η, a low level of inherited human capital $\overline{h}$ and a non favourable attitude to women employment are associated with a high Ψ and Ψ'. In such a society women do not invest in education and even those who invest may find it convenient not to participate, with negative effects on growth. Instead, when there is a critical mass of educated women, the tax-transfer scheme can be politically supported. In this case, the level of the equilibrium tax rate shows intuitive features: it is higher when the cultural environment I is less favourable to women occupation, when the average child care cost $\overline{\rho}$ is higher and when the government finances a higher share of the child care cost. As we showed before, this tax-transfer scheme has positive repercussions on the working of the economy.

5 Concluding Remarks

In a context of asymmetric information on individual characteristics related to child care costs, high average child care costs reduce the incentives to invest in human capital and they may induce educated women not to participate. An institutional and cultural framework which is favourable to female employment may compensate for this individual heterogeneity and strengthen the incentives to invest in education and to work, with positive repercussions on growth.

In terms of policy implications, our analysis suggests that promoting an institutional and cultural environment in favor of women education and employment may generate economic benefits in terms of growth. We have identified a tax-transfer scheme which fulfils this purpose. The Lisbon strategy goes in this direction, identifying target values for European countries on female employment and on the institutional measures which may favor it (child care services, parental leaves etc). In particular, we have stressed that incentives to education and to employment go hand in hand. Focusing on them may represent a good strategy to promote the macroeconomic performance of any country. Our results also suggest that the waste of talent arising when women do not invest in human capital or when educated women do not work may contribute to explain the low growth rates of the last decades of some European countries (Italy, for example). This is a perspective typically ignored by the empirical studies on the determinants of growth.

6 Appendix

6.1 Part A

We here show that, at any time t,when I is higher, the loss of human capital is lower, i.e. $\frac{\partial L}{\partial I} < 0$. From (19) we have that

$$\frac{\partial L}{\partial I} = \frac{\pi h_t \frac{\partial \left(\int_{\Psi}^{\Psi'} f(e)de \right)}{\partial I} \int_{\Psi}^{1} f(e)de - \pi h_t \int_{\Psi}^{\Psi'} f(e)de \frac{\partial \left(\int_{\Psi_t}^{1} f(e)de \right)}{\partial I}}{h_t \left(\int_{\Psi}^{1} f(e)de \right)^2} \tag{39}$$

thus, $\frac{\partial L}{\partial I} < 0$ if the following condition is satisfied:

$$\frac{\partial \left(\int_{\Psi}^{\Psi'} f(e)de \right)}{\partial I} \int_{\Psi}^{1} f(e)de - \int_{\Psi}^{\Psi'} f(e)de \frac{\partial \left(\int_{\Psi}^{1} f(e)de \right)}{\partial I} < 0$$

Calculating the derivatives the above condition becomes:

$$\left[f(\Psi') \frac{\partial \Psi'}{\partial I} - f(\Psi) \frac{\partial \Psi}{\partial I} \right] \int_{\Psi}^{1} f(e)de - \left[-f(\Psi) \frac{\partial \Psi}{\partial I} \right] \int_{\Psi}^{\Psi'} f(e)de < 0$$

which can be rewritten as follows:

$$\frac{\partial \Psi}{\partial I} f(\Psi) \left[-\int_{\Psi}^{1} f(e)de + \int_{\Psi}^{\Psi'} f(e)de \right] + f(\Psi') \frac{\partial \Psi'}{\partial I} \int_{\Psi}^{1} f(e)de < 0$$

and finally as follows:

$$-\frac{\partial \Psi}{\partial I} f(\Psi) \int_{\Psi'}^{1} f(e)de < -\frac{\partial \Psi'}{\partial I} f(\Psi') \int_{\Psi}^{1} f(e)de$$

We already know from equations (11) and (13) that $\frac{\partial \Psi}{\partial I} < 0$ and $\frac{\partial \Psi'}{\partial I} < 0$. If f is uniform, $f(\Psi) = f(\Psi')$. Moreover, since $\Psi < \Psi'$ from (14), we have that $\int_{\Psi'}^{1} f(e)de < \int_{\Psi}^{1} f(e)de$. Thus, a sufficient condition for $\frac{\partial L_{t+1}}{\partial I} < 0$ is

$$\left| \frac{\partial \Psi}{\partial I} \right| < \left| \frac{\partial \Psi'}{\partial I} \right|$$

We now show that, when $\frac{\alpha\delta}{\alpha-\beta} = 1$ and $\delta = \gamma$,the above sufficient condition is always satisfied. Consider equations (23) and (24)and rewrite them as follows:

$$\Psi = \frac{\Sigma}{(1 - \frac{\overline{\rho}}{I})(1 - \frac{\beta}{\alpha})} \tag{40}$$

$$\Psi' = \frac{\Sigma}{(1 - \frac{\rho^H}{I})} \tag{41}$$

where

$$\Sigma = \nu \eta e$$

Differentiating (40) and (41), we obtain:

$$\left|\frac{\partial \Psi}{\partial I}\right| = \frac{\Sigma}{(1 - \frac{\beta}{\alpha})} \frac{\frac{\overline{\rho}}{I^2}}{(1 - \frac{\overline{\rho}}{I})^2}$$

$$\left|\frac{\partial \Psi'}{\partial I}\right| = \Sigma \frac{\frac{\rho^H}{I^2}}{(1 - \frac{\rho^H}{I})^2}$$

Simplifying and adjusting terms, we have that $\left|\frac{\partial \Psi}{\partial I}\right| < \left|\frac{\partial \Psi'}{\partial I}\right|$ when:

$$\left(\frac{I - \overline{\rho}}{I - \rho^H}\right)^2 \frac{\rho^H}{\overline{\rho}} > \frac{\alpha}{\alpha - \beta} \tag{42}$$

From condition (14) we know that $\left(\frac{I - \overline{\rho}}{I - \rho^H}\right) > \frac{\alpha}{\alpha - \beta}$. Since $\frac{\rho^H}{\overline{\rho}} > 1$, it is $\left(\frac{I - \overline{\rho}}{I - \rho^H}\right) > 1$ and therefore $\left(\frac{I - \overline{\rho}}{I - \rho^H}\right)^2 > \left(\frac{I - \overline{\rho}}{I - \rho^H}\right)$.Thus condition (42) is always satisfied. Thus, $\left|\frac{\partial \Psi}{\partial I}\right| < \left|\frac{\partial \Psi'}{\partial I}\right|$ which guarantees that $\frac{\partial L}{\partial I} < 0$.Q.E.D.

6.2 Part B

We here show that the government budget constraint expressed by (27) guarantees that $\tau \leq \frac{\varphi \overline{\rho}}{I}$. To do this, rewrite the government budget constraint expressed by (27) as follows:

$$\begin{aligned} &\tau \left[\pi \int_{\Psi'_{t+1}}^{1} w^i_{t+1} f(e) de + (1 - \pi) \int_{\Psi_t}^{1} w^i_{t+1} f(e) de + \widehat{w}_{t+1} \int_0^1 f(e) de\right] \\ = &\left[\pi \varphi \frac{\rho^H}{I} + (1 - \pi) \varphi \frac{\rho^L}{I}\right] \left[\int_{\Psi'_{t+1}}^{1} w^i_{t+1} f(e) de + \widehat{w}_{t+1} \int_{\Psi'_{t+1}}^{1} f(e) de\right] + \\ &(1 - \pi) \varphi \frac{\rho^L}{I} \left[\int_{\Psi_t}^{\Psi'_{t+1}} w^i_{t+1} f(e) de + \widehat{w}_{t+1} \int_{\Psi_t}^{\Psi'_{t+1}} f(e) de\right] \end{aligned}$$

which can be rewritten as follows:

$$\tau \Lambda = \frac{\varphi \overline{\rho}}{I} \Delta + \frac{\varphi \rho^L}{I} (1 - \pi) \Omega$$

where

$$\Lambda = \pi \int_{\Psi'_{t+1}}^{1} w^i_{t+1} f(e) de + (1-\pi) \int_{\Psi_t}^{1} w^i_{t+1} f(e) de + \widehat{w}_{t+1} \int_0^1 f(e) de$$

$$\Delta = \int_{\Psi'_{t+1}}^{1} w^i_{t+1} f(e) de + \widehat{w}_{t+1} \int_{\Psi'_{t+1}}^{1} f(e) de$$

and

$$\Omega = \int_{\Psi_t}^{\Psi'_{t+1}} w^i_{t+1} f(e) de + \widehat{w}_{t+1} \int_{\Psi_t}^{\Psi'_{t+1}} f(e) de$$

and finally as follows:

$$\tau = \frac{\varphi\overline{\rho}}{I} \frac{\Delta}{\Lambda} + \frac{\varphi\rho^L}{I}(1-\pi)\frac{\Omega}{\Lambda} \tag{43a}$$

Thus, we have that $\tau \leq \frac{\varphi\overline{\rho}}{I}$ when

$$\frac{\varphi\overline{\rho}}{I} \frac{\Delta}{\Lambda} + \frac{\varphi\rho^L}{I}(1-\pi)\frac{\Omega}{\Lambda} \leq \frac{\varphi\overline{\rho}}{I}$$

which, after simple algebra, becomes:

$$\rho^L(1-\pi)\Omega \leq \overline{\rho}(\Lambda - \Delta) \tag{44a}$$

Now we reintroduce the expressions for Ω, Λ and Δ to rewrite the above condition (44a) as follows:

$$\begin{aligned} & \rho^L(1-\pi)\left[\int_{\Psi_t}^{\Psi'_{t+1}} w^i_{t+1} f(e) de + \widehat{w}_{t+1} \int_{\Psi_t}^{\Psi'_{t+1}} f(e) de\right] \\ \leq \quad & \overline{\rho}\left[\begin{array}{c} \pi \int_{\Psi'_{t+1}}^1 w^i_{t+1} f(e) de + (1-\pi)\int_{\Psi_t}^1 w^i_{t+1} f(e) de + \\ \widehat{w}_{t+1} \int_0^1 f(e) de - \int_{\Psi'_{t+1}}^1 w^i_{t+1} f(e) de - \widehat{w}_{t+1} \int_{\Psi'_{t+1}}^1 f(e) de \end{array}\right] \end{aligned}$$

Shifting all members containing w^i_{t+1} on the left hand side and all members containing $\widehat{w}_{t+1}$ on the right hand side the above condition becomes:

$$\rho^L(1-\pi)\int_{\Psi_t}^{\Psi'_{t+1}} w^i_{t+1} f(e) de - \overline{\rho}(1-\pi)\int_{\Psi_t}^{1} w^i_{t+1} f(e) de - \overline{\rho}\pi \int_{\Psi'_{t+1}}^{1} w^i_{t+1} f(e) de + \tag{45}$$

$$\overline{\rho}\int_{\Psi'_{t+1}}^{1} w^i_{t+1} f(e) de \tag{46}$$

$$\leq \quad \overline{\rho}\widehat{w}_{t+1}\int_0^1 f(e) de - \overline{\rho}\widehat{w}_{t+1}\int_{\Psi'_{t+1}}^1 f(e) de - \rho^L(1-\pi)\widehat{w}_{t+1}\int_{\Psi_t}^{\Psi'_{t+1}} f(e) de$$

Remembering that $0 < \Psi_t < \Psi'_{t+1} < 1$, after simple algebra the left hand side and the right and side of the above condition (45)can be written respectively as

$$\left(\rho^L - \overline{\rho}\right)(1-\pi)\int_{\Psi_t}^{\Psi'_{t+1}} w^i_{t+1} f(e)de$$

and

$$\overline{\rho}\widehat{w}_{t+1}\int_0^{\Psi_t} f(e)de + \left[\overline{\rho} - \rho^L(1-\pi)\right]\widehat{w}_{t+1}\int_{\Psi_t}^{\Psi'_{t+1}} f(e)de$$

Since $\rho^L \leq \overline{\rho}$ the left hand side of (45) is (weakly) negative, while, since $\overline{\rho} \geq \rho^L(1-\pi)$ the right hand side of (45) is (weakly) positive. Thus, condition (45) is always satisifed. Thus, the government budget constraint at (27) guarantees that $\tau \leq \frac{\varphi\overline{\rho}}{I}$. QED

References

[1] Albanesi, S. and Olivetti, C. (2006). Home production, market production and the gender wage gap: incentives and expectation. NBER W.P. 12212

[2] Bernasconi M. and Profeta P. (2007). Redistribution or Education? The political economy of the social race. W.P. Econpubblica-Università Bocconi, W.P. Cesifo Munich

[3] Bjerk D. and Han S. (2007). Assortative Marriage and the Effects of Government Homecare Subsidy Programs on Gender Wage and Participation Inequality, Journal of Public Economics, June, 1135-1150.

[4] Del Boca D. Pasqua S. and Pronzato C. (2007). The Impact of Institutions on Motherhood and Work, WP Child n.06/2007

[5] De Henau J. Meulders D. and O'Dorchai S. (2007). Parents'care and Career. Comparing Parental Leaves Policies, in Social Policies, Labour Markets and Motherhood: A Comparative Analysis of European Countries (Del Boca D. and Wetzels C. eds) Cambridge University Press.

[6] Eurostat, www.epp.eurostat.ec

[7] Fernandez R. (2007). Women, Work, and Culture, Journal of the European Economic Association, 2007, 5(2-3), 305-332.

[8] Fernandez R. and Fogli A. (2007). Culture: An Empirical Investigation of Beliefs, Work, and Fertility, mimeo.

[9] Francois P.(1998) Gender Discrimation without Gender Difference: Theory and Policy Responses, Journal of Public Economics Vol.68, 1-32.

[10] Galor, O. and D. Tsiddon (1997). Technological Progress, Mobility, and Growth, American Economic Review 60, pp. 35-52.

[11] Glomm, G. and B. Ravikumar (1998). Opting Out of Publicly Provided Services: a Majority Voting Result, Social Choice and Welfare 15, pp. 187-193.

[12] Lommerud K. and Vagstad E. (2007). Mommy tracks and public policy: On self-fullfilling prophecies and gender gaps in promotion, mimeo.

[13] Lucas, R.E. (1988) On the Mechanics of Economic Development, Journal of Monetary Economics 22, 3-42.

[14] OECD, 2007, Education at a Glance.

[15] World Value Surveys, Four-wave integrated data file, 1981-2004.

Table 1

	Female Tertiary Education /Total 25-64	Male Tertiary Education /Total 25-64	GAP Education	Employed female with tertiary education/Female with tertiary education	Employed male with tertiary education/male with tertiary education	GAP Educated employed
Austria	15.16	20.37	5.21	81.80	86.57	4.78
Belgium	31.91	29.89	-2.03	81.38	88.11	6.73
Denmark	35.90	30.95	-4.95	84.74	88.64	3.90
France	25.49	23.59	-1.89	82.30	86.75	4.45
Germany	20.31	28.80	8.49	79.71	86.32	6.61
Greece	19.63	22.20	2.57	76.83	84.42	7.59
Iceland	33.88	27.24	-6.64	86.35	90.14	3.79
Ireland	30.20	27.55	-2.65	81.78	90.07	8.28
Italy	12.73	11.02	-1.71	75.85	90.79	14.94
Luxembourg	24.11	28.94	4.83	78.00	88.62	10.62
Netherlands	27.09	32.68	5.59	83.22	87.03	3.81
Norway	35.27	30.00	-5.27	86.18	91.11	4.93
Portugal	14.97	10.64	-4.32	86.29	88.78	2.49
Spain	27.91	28.10	0.19	78.64	87.30	8.66
Sweden	34.35	25.07	-9.28	86.14	87.50	1.36
United Kingdom	29.53	29.75	0.22	79.76	86.75	6.99
Authors' calculations from Eurostat and OECD, year 2005						

Figure 1a

Female tertiary education and part-time employment

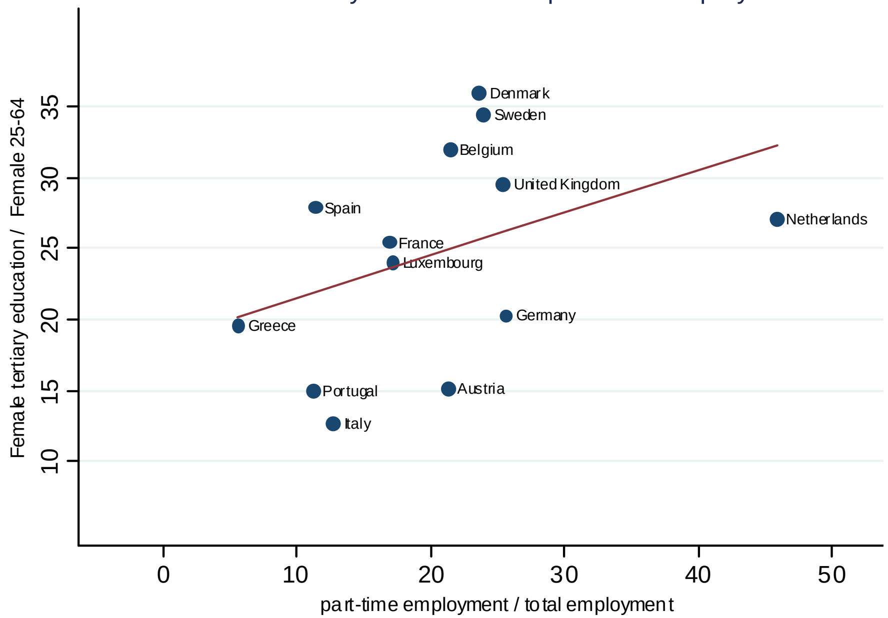

Figure 1b

Female tertiary education and childcare services (0-2)

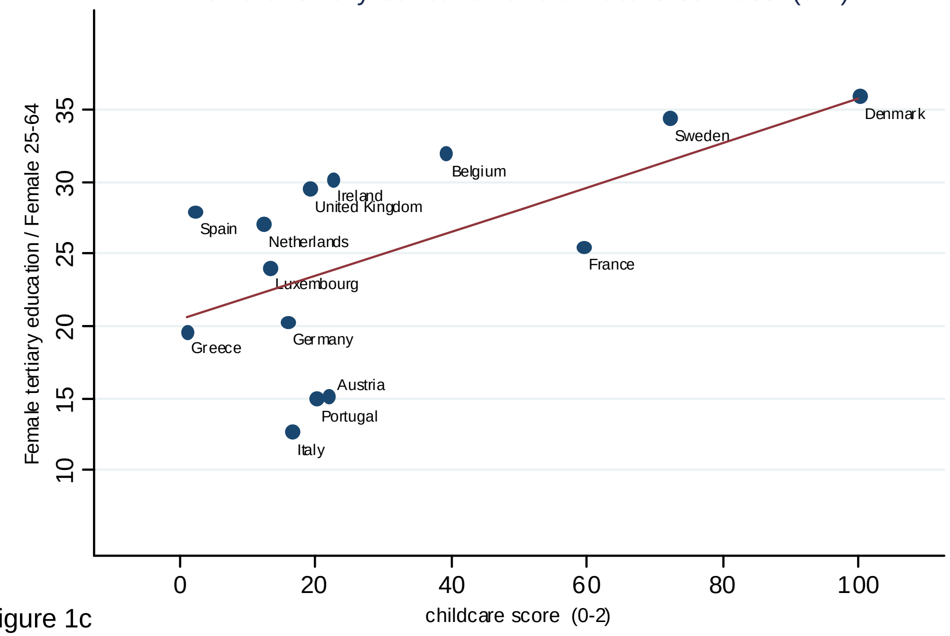

Figure 1c

Female tertiary education and culture index

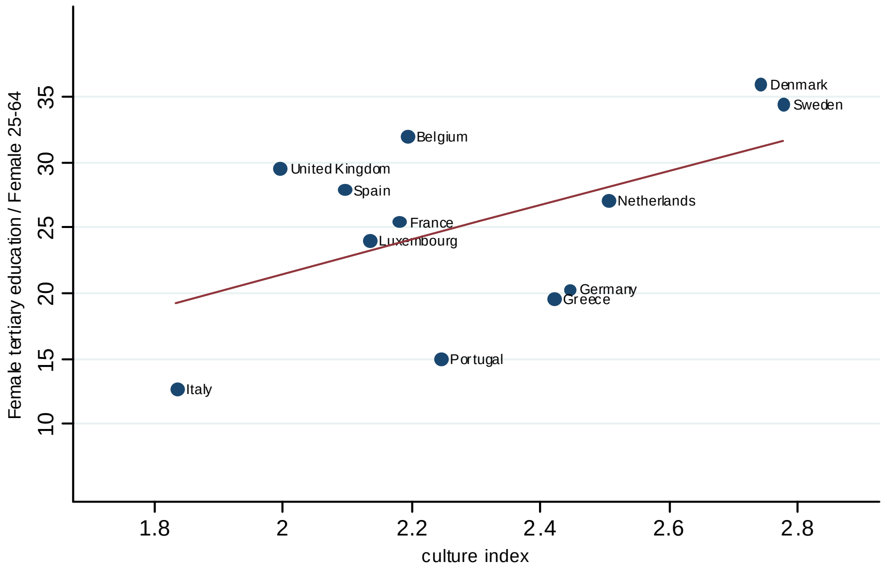

Figure 2a

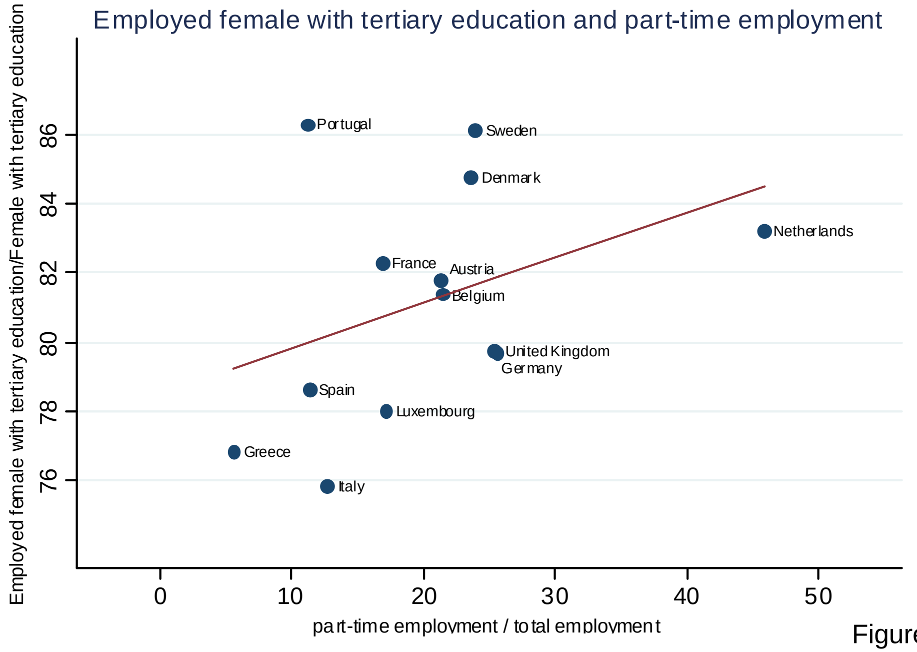

Figure 2b

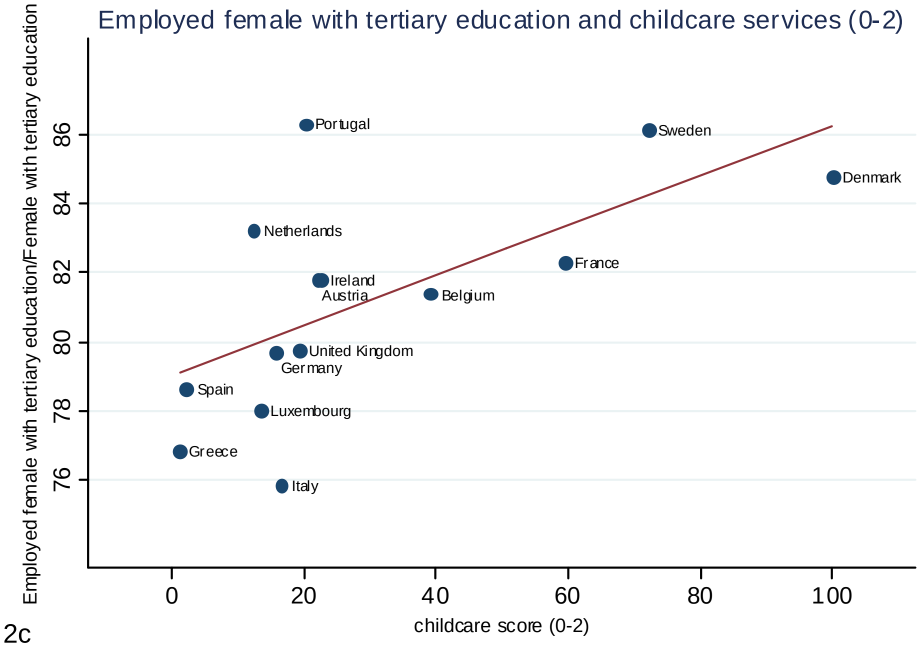

Figure 2c