The Italian Couples' Division of Labour after a Birth: Do Gender Attitudes Matter?

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Abstract The aim of this study is to assess the gender attitudes influence on the partners' allocation of both paid and unpaid work hours when they experienced the transition to parenthood. To this purpose, we use a cluster-based classification of couples according to gender attitudes. The classification gives dummies that are added as explanatory variables in a Difference-in-Differences estimation procedure. We adjust for endogeneity of fertility on working activities by introducing a specific instrumental variable. For the empirical analysis we use data on Italian couples provided by the Istat Multipurpose Panel Survey in the years 2003 and 2007.

Keywords Life course transition · Difference-in-Differences estimator · Gender-attitudes items score

Introduction

In this study, we adopt a Difference-in-Differences (*DID*) model to estimate the effect of transition to parenthood on the partners' allocation of working time. In particular, we aim to manage the gender attitudes influence on the labour division within the couple. To this purpose, we perform a cluster procedure to classify the couples in homogeneous groups according to their gender attitudes. Thus, we use the classification results to specify the gender attitudes impact on both paid and unpaid work estimates. Moreover, in order to correct the endogenous influence of fertility on labour supply, we use as an instrumental variable (*IV*) a preliminary reduced-form estimate of the woman cumulative fertility (number of children ever born). Finally, a Generalized Least Square

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(*GLS*) procedure is adopted to estimate simultaneously paid and unpaid work supply of both partners.

We apply our model to a sample of Italian married and cohabiting couples. As it is well-known, Italian women generally suffer a higher gender gap in intra-household labour division than elsewhere in Europe [1, 4]. In our study, using longitudinal data from the Istat Multipurpose Panel Survey for years 2003 and 2007, we try to evaluate to what extent this gender gap unfavourable to women is influenced by couples' gender attitudes. Our results show that traditional gender attitudes negatively influence women paid work supply, while they are weakly associated to domestic activity. We also aim to ascertain the effect of an additional birth on the partners' division of labour and to account for the interactional effect of gender attitudes.

The paper is organized as follows: in the next Section we explain the rationale of our methodology and estimation procedure. In Sect. 3, we report the characteristics of the dataset and discuss the estimation results.

Methodological Issues and Model Specification

Since gender attitudes influence both participation in the labour market and fertility decisions, in this analysis we explicitly take into account these dimensions. In particular, we use an "attitude index score" as a proxy-measure of concordance of the subjects to the traditional attitudes [8]. This index is obtained taking into account the level of agreement of each subject in 2003 to the following five statements: 1) marriage is an outdated institution; 2) a couple can live together without planning to marry; 3) a woman can have child alone even if she doesn't want a relation; 4) children aged 18-20 years old should leave parents' home; 5) it is right that unhappy spouses divorce, even if they have had children. The degree of agreement has been expressed by the interviewed subjects on a five items scale from (a) strongly disagree to (e) strongly agree. We standardized the scores assigning values 1, 2, 3, 4 and 5, respectively, to the responses a), b), c), d) and e). Then computing the mean of the scores for each subject, we create a scalar index measuring individual agreement with these statements. We test the reliability of the items scores with a specific "alpha" test [5]. In particular, we obtain a high value (equal to 0.76) of the "alpha" statistics (the range of the alpha statistics is bounded from 0 to 1).

Then we perform a cluster procedure applying the Ward algorithm, and taking into account the gender attitudes score index and a categorical variable signaling the level of satisfaction of partners with division of labour in 2003 as classification variables. The Calinski – Harabasz test is applied to choose the number of groups. In this way, a partition of the sample in two groups is provided: a group of "traditional" couples whose partners disagree with the five statements, and a group of "modern" couples whose partners show an agreement with these statements. We use the results of the clustering to obtain a dummy variables signaling if a couple belongs to a more traditional or to a modern group as to gender attitudes. This dummy is included in the model as regressor to specify the impact of gender attitudes on the partners' allocation of time.

Thus, we have to face another methodological problem, which is the potential bias on estimates given by the endogeneity of fertility. To correct this bias, we adopt an *IV* approach, and specific instruments are provided to identify fertility behavior [7]. To

estimate fertility in a reduced form, we use the sex of previous children as most relevant instrument. This follows from the finding that parents prefer "balanced" families in terms of the sex composition of their children, and are more likely to have an additional child if the previous ones are of the same sex. We consider this instrument as a good predictor of fertility, but not of working activity, in the sense that sex of children should not influence directly the decision to participate in the labour market. The sex of the first child or of the first and second child explain the completed fertility in 2003 of two or three children. As a consequence, the instrument does not apply to women with 0 children or 1 child in 2003. Nevertheless, in the preliminary version of this paper, we decide not to drop the women without children or with one child from the sample. In fact, we consider other instruments such as the woman's number of siblings and the fertility level of the region of residence that can explain these lower parities.

More in details, in the "reduced-form" Poisson regression of woman's fertility (as number of children ever born), we include dummies signaling sex composition of children as instruments that are independent from the decision to participate in the labour market (exclusion restrictions). Validity of instruments is confirmed by the estimation results of Poisson regression (not reported here for the sake of brevity) showing that the coefficients of dummies of the sex of previous children are positive and significant. Namely, Italian partners would have an additional child if the first child is a girl. Variables such as woman's parents education, number of siblings, age difference between partners, a dummy proxy of religiosity, total fertility rate of the region of residence and the previously computed gender attitudes score are included in the regression as further exogenous regressors of the Poisson regression. Particularly, the fertility level of the region of residence shows a significant effect on the 2003 completed fertility (results not shown). In summary, in order to correct estimates for endogeneity of fertility, we adopt a two-stage procedure. At a first stage, a reduced-form Poisson regression of fertility is run, and a variable measuring the completed fertility is provided. At a second stage, the predicted fertility is included as an instrumental variable in each equation of a simultaneous-equation model, where paid and unpaid work equations of both partners are estimated simultaneously using an iterative *GLS* procedure.

Equations referring to both partners domestic and work hours are here modelled simultaneously. Therefore, our model is specified as follows:

$$\ln L_{wti} = \mathbf{s'}_i \boldsymbol{\alpha}_{Lw} + \lambda_{Lw} t + t \cdot \mathbf{s'}_i \boldsymbol{\delta}_{Lw} + \mathbf{x'}_i \boldsymbol{\beta}_{Lw} + \mathbf{z'}_{ti} \boldsymbol{\gamma}_{Lw} + \phi_{Lw} \hat{Ch}_i + u_{Lwti} \quad (1)$$

$$\ln D_{wti} = \mathbf{s'}_i \boldsymbol{\alpha}_{Dw} + \lambda_{Dw} t + t \cdot \mathbf{s'}_i \boldsymbol{\delta}_{Dw} + \mathbf{x'}_i \boldsymbol{\beta}_{Dw} + \mathbf{z'}_{ti} \boldsymbol{\gamma}_{Dw} + \phi_{Dw} \hat{Ch}_i + u_{Dwti} \quad (2)$$

$$\ln L_{mti} = \mathbf{s'}_i \boldsymbol{\alpha}_{Lm} + \lambda_{Lm} t + t \cdot \mathbf{s'}_i \boldsymbol{\delta}_{Lm} + \mathbf{x'}_i \boldsymbol{\beta}_{Lm} + \mathbf{z'}_{ti} \boldsymbol{\gamma}_{Lm} + \phi_{Lm} \hat{Ch}_i + u_{Lmti} \quad (3)$$

$$\ln D_{mti} = \mathbf{s'}_i \boldsymbol{\alpha}_{Dm} + \lambda_{Dm} t + t \cdot \mathbf{s'}_i \boldsymbol{\delta}_{Dm} + \mathbf{x'}_i \boldsymbol{\beta}_{Dm} + \mathbf{z'}_{ti} \boldsymbol{\gamma}_{Dm} + \phi_{Dm} \hat{Ch}_i + u_{Dmti} \quad (4)$$

The dependent variables are given by the logarithm of weekly working hours of, respectively, women's paid work and domestic work (eqs. 1-2), and men's paid work and domestic work (eqs. 3-4). The dependent variables are observed on the same subject at the first time period, $t = 0$, and at the second time period, $t = 1$. The indexes *i* and *t* refer respectively to the *i-th* individual and to time *t* (0, 1). The indexes *w* and *m* refer, respectively, to women and men. On the right side of each equation, Greek letters refer to parameters, while Latin letters correspond to explanatory variables. Namely, $\boldsymbol{\alpha}$ is a vector of coefficients measuring the impact of life course events included in the row vector $\mathbf{s'} = [s_1\ s_2\ \ldots]$, in particular this paper will be focused on the transition to

parenthood. In this case the (time invariant) dummy signals that the subject becomes parent between 2003 and 2007. Consequently, $t \cdot \mathbf{s'} = [t \cdot s_1 \; t \cdot s_2 \; \ldots]$ is a row vector whose elements are dummies that signal if status has changed in year 2007 compared to 2003. Thus, the scalar product between the vector $t \cdot \mathbf{s'}$ and the vector of coefficients $\boldsymbol{\delta}$, given by $t \cdot \mathbf{s'\delta}$, measures the interaction effect of both status and time. This represent the *DID* specification of transition to parenthood.

The impact of time-invariant and of time-varying vectors of control variables on dependent variables is measured, respectively, by $\mathbf{x'}_i\boldsymbol{\beta}$ and $\mathbf{z'}_i\boldsymbol{\gamma}$. The vector $\mathbf{x'}_i\boldsymbol{\beta}$ include also the dummy variable measuring gender attitudes. Control variables, referred to the subject or to the couple, are given by education, the Italian macro-region of residence, age, residing in an urban area (dummy) and hourly-wage. The influence of the cumulated fertility is measured by $\phi\,\hat{C}h$, where the instrumental variable $\hat{C}h$ is the predicted values of the reduced-form Poisson estimation of the number of children ever born. We adopt the logarithms of weekly working hours as dependent variables, while explanatory variables are included in the regression using original values. In doing so, coefficients of these regressors can be considered as "semi-elasticities" measuring the impact on the dependent variable in percentage terms. This allows us to better evaluate the joint influence of two or more regressors by adding together the respective estimated coefficients. To correct estimates for latent factors' influence, we assume that covariances between the error terms of each equation (cross-sectional heterogeneity) and across time (correlation between repeated observations) are non-zero. Given these assumptions, we apply an iterative *GLS* estimation procedure using residual-based estimation of the error covariance matrix. However, a further estimation problem occurs because of censoring in dependent variables given by non-working status of the subjects. The solution here adopted to avoid selectivity bias is to run a *Tobit Random-Effects* at the first step of the iterative procedure. In this way, missing data on paid and unpaid work are replaced using *Tobit* predicted values, and, at the second step, *Least Squares* regression can be run.

To simplify the model, we estimate the effects of parenthood transition by using three distinct sample stratifications corresponding to different birth orders. First, we consider couples who experienced the transition to parenthood (whatever the order) in the period 2003-2007, including the couples that had two (or more) children between 2003 and 2007 (17 couples in total). Second, we take into account the couples that experienced the transition to the first birth, with couples without children in 2003 as controls. Third, we estimate the effect of transition to a second order of birth, considering couples with one child in 2003 as controls.

Estimation Results and Discussion

We use data from the Istat Multipurpose Panel Survey resulting in 9,997 individuals. The survey produced a two-wave balanced panel sample, as all individuals are surveyed over time at the time $t = 0$ (year 2003), and at the time $t = 1$ (year 2007). Information on both paid and domestic work (childcare included), life-course events, and fertility was collected. For our study we select a sub-sample of 956 Italian couples of active partners, employed or unemployed, (only partners who live together in both periods 2003 and 2007), for a total of 1,912 individuals. In our sub-sample women are aged 18-

45 and their partners are aged 18-60 in 2003. ISTAT Multipurpose dataset contains no information on income. Thus, we apply a matching procedure (using the conditional propensity score method) in order to import information on hourly labour income data (in Euros) from the Bank of Italy Surveys on Household Income and Wealth conducted in the years 2002 and 2006. For both years income is converted according to the 2007 price-index.

The results of the clustering procedure, as discussed previously in Sect.2, allow us to provide a dummy variable summing up gender attitudes that is introduced as regressor in paid and unpaid work equations. This dummy is equal to one for more traditional couples who are strongly influenced by gender role social norms. To better ascertain the interaction effect of attitudes and parenthood on both paid and unpaid work, we add the dummies *Birth*Attitude* and *t*Birth*Attitude* in the regressors set, where "*Birth*" is the time invariant dummy equal to 1 if the subject experience the transition to parenthood between 2003 and 2007 and where "t" is equal to 1 for the year 2007. For the sake of brevity, in Table 1 we report only the estimated coefficients of parenthood transition, gender attitude effects, and predicted fertility (instrumental variable) estimated at a first stage by a Poisson regression. Estimation results are referred, respectively, to all orders of birth, first birth and second birth. Estimated coefficients reported in Table 1 show that, considering *all order of birth*, the traditional gender attitudes of couples negatively affect the woman paid-work supply, with a reduction of market working activity of 11% (-0.58+0.29+0.18). A further reduction of woman paid-work is also due to a direct influence of the birth of a child (measured by the sum of *t* and *t*Birth* parameters), equal to -55% (-0.34 -0.21). The influence of parenthood transition on woman's domestic work is positive and equal to 32% (0.46-0.14), while traditional gender attitudes effect is equal to 2% (0.09 -0.01 -0.06). Analogously, considering the *transition to the first birth*, we can observe that the influence of gender attitudes concurs to emphasise the reduction of women's market work as a consequence of motherhood. The reduction of paid work due to the birth of the first child is equal to 21% (0.87-1.08). Instead, the impact of gender attitudes on woman domestic work is generally low. Note that for men, contrary to what happens for women, market and domestic working activities seem to be less sensitive to transition to fatherhood (all orders). Interestingly, the time devoted to domestic work by men increases over time of 35% after transition to fatherhood. With respect to the previous studies on intra-household labour division [1], our estimates confirm that Italian women are disadvantaged in both market and domestic work by the birth of a child, while gender attitudes matter for woman's paid work but not for domestic work.

Table 1: Estimates of the *GLS-DID* procedure considering the sample with all orders of birth and sub-samples for transition to first and second birth.

Dependent variable (log):	*Women*			*Men*	
	Work	Paid coeff.	Unpaid coeff.	Paid coeff.	Unpaid coeff.
*Transition to parenthood (**all orders**, no.: 956 couples; 1912 subjects; 165 transitions)*					

Fertility (instrumental variable)	-0.23 ***	0.20 ***	0.04	0.14 **
t (Dummy: 0=2003;1=2007)	-0.20 ***	-0.05	-0.01	0.35 ***
Birth (parenthood transition)	-0.21 *	-0.14	0.08	0.24
*t*Birth*	-0.34 **	0.46 ***	-0.17	-0.38
Attitudes (Dummy: traditional=1; modern=0)	-0.58 ***	0.09 **	0.05	-0.03
*Birth*Attitudes*	0.29 **	-0.01	-0.07	-0.05
t Birth *Attitudes*	0.18	-0.06	0.11	0.62 **
*Transition to a **first birth** (no.: 112 couples; 224 subjects; 53 transitions)*				
Fertility (instrumental variable)	-2.10 ***	0.68 *	0.27	0.58
t (Dummy: 0=2003;1=2007)	-0.19	0.11	0.08	0.39 *
Birth (parenthood transition)	0.87 ***	-0.70 ***	-0.04	0.18
*t*Birth*	-1.08 ***	1.09 ***	-0.41	-0.26
Attitudes (Dummy: traditional=1;modern=0)	-0.41 ***	-0.01	-0.07	-0.18
*Birth*Attitudes*	-0.28	0.54 **	0.07	-0.18
t Birth *Attitudes*	0.52 *	-0.58 *	0.26	0.77
*Transition to a **second birth** (no: .302 couples; 604 subjects; 77 transitions)*				
Fertility (instrumental variable)	-0.79 ***	-0.21	0.31	-0.07
t (Dummy: 0=2003;1=2007)	-0.06	-0.09	0.01	0.34 **
Birth (parenthood transition)	-0.64 ***	0.06	0.09	0.33
*t*Birth*	-0.21	0.27	-0.12	-0.34
Attitudes (Dummy: traditional=1; modern=0)	-0.75 ***	0.10	0.01	-0.08
*Birth*Attitudes*	0.68 ***	-0.15	-0.10	0.06
t Birth *Attitudes*	0.07	0.14	0.05	0.62

*Note: p-value = * p<0.05; ** p<0.01; *** p<0.001*

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