

Gender equality and fertility: evidence from Italian provinces

Alberto Basso*

This draft: June 2017

Abstract

This paper provides suggestive evidence regarding the relationship between gender (in)equality and fertility in Italy. Using panel fixed-effects regressions and province-level data for the period 2004-2015, we find a U-shaped relationship between gender equality in employment and fertility. Our findings suggest that if gender gaps in employment are large, improvements in gender equality initially reduce fertility with the effect turning positive only when relatively high levels of gender equality (i.e. relatively small gender gaps) are achieved. We also investigate possible explanations for this relationship that are related to norms (secularisation) and to the availability/utilisation of childcare services; we find more robust evidence in favour of the former.

Keywords: fertility, gender equality, employment, secularisation

JEL Classifications: J10, J20, Z10

*Plymouth Business School, University of Plymouth, Cookworthy Building, Drake Circus, Plymouth, PL4 8AA, UK. Email: alberto.basso@plymouth.ac.uk.

1 Introduction

When we compare fertility across countries, we observe large differences. Many least/less developed countries are characterised by fertility levels that are well above replacement - total fertility rate (TFR) of 2.1 - whereas most developed countries have relatively low fertility. For example, in 2010-15 Sub-Saharan Africa has a TFR of 5.10 whereas many Western European countries have TFRs well below 2.1 (United Nations Population Division 2015). Both high and (too) low fertility represent, for different reasons, a potential issue from a country's perspective (e.g. Bloom et al. 2001; Smeeding 2014).

The differences in fertility that we currently observe across countries are mainly the result of differences in the timing of the onset of the fertility transition. The forerunners in this respect, such as Western Europe and the U.S., experienced sustained reductions in fertility since the late 19th and early 20th century whereas for many developing countries this process started in the post-1950 period (e.g. Reher 2004). While some countries and regions are yet to witness a clear onset of a structural decline in fertility towards the replacement level, in many other countries the decline in fertility has gone beyond (below) the replacement level, a phenomenon called "second demographic transition" (e.g. van de Kaa 2002). This situation has characterised some developed countries for several decades and it now concerns a much larger number of countries.

Several explanations have been proposed for a decline of fertility below the replacement level. The arguments range from the interaction between higher women's labour market participation and lack of "institutional" adaptation (e.g. McDonald 2000) to ideological innovations that led to higher behavioural freedom (e.g. Lesthaeghe 1983) and to more individualistic attitudes (e.g. van de Kaa 2002).

Since the late 1990s in some European countries fertility has reversed its declining trend. A few countries have escaped lowest-low fertility rates ($TFR < 1.3$), others have made a substantial recovery towards the replacement-level (e.g. Goldstein et al. 2009).

Changes/differences in gender equality, and in aspects related to it, have been proposed as a possible

comprehensive explanation (e.g. Baizan et al. 2016) for changes in fertility within a given area (initial reduction of fertility below the replacement level and a subsequent recovery) and differences in fertility across different areas (very low fertility vs fertility level close to replacement). One argument is that higher gender equality in employment in a context in which there is low gender equality at the family level (i.e. rigid gender roles and unequal allocation/distribution of household production) would reduce fertility. On the other hand, higher gender equality in employment would bring about higher fertility in a context in which social norms have evolved towards high gender equality in the institutions of the family. This argument suggests a U-shaped relationship between gender equality and fertility (e.g. McDonald 2000; Aassve et al. 2012; Arpino et al. 2015).

Italy is among the countries currently characterised by very low fertility; its TFR declined below the replacement level in the late 1970s and since then it has remained below 1.5 (United Nations Population Division 2015). Some evidence of a slight recovery pattern has been found also in Italy (e.g. Caltabiano et al. 2009) but over the last decade there is no clear evidence of a stable/structural upward trend.¹

This paper contributes to the literature by expanding the body of evidence regarding the relationship between gender equality and fertility by using a macro-level analysis at the sub-national level for a specific country (Italy). Using panel fixed-effects regressions and province-level data for the period 2004-2015, we find a non-linear U-shaped relationship between gender equality in employment (measured using the women-to-men employment rate ratio) and fertility. Our findings suggest that if gender gaps in employment are large, improvements in gender equality initially reduce fertility with the effect turning positive only when relatively high levels of gender equality (i.e. relatively low gender gaps) are achieved. This result is robust to controlling for various potential determinants of fertility. We also investigate two possible explanations for the U-shaped relationship: one about cultural norms potentially related to gender roles within the family (e.g. McDonald 2000); another about the availability or utilisation of childcare services, where the latter has been also associated to the degree of trust among individuals (Aassve et al. 2012). We find more robust evidence for

¹For example, considering province-level data, general increases in the TFR over the period 2005-2010 have been followed in most cases by a downward trend over 2010-2015.

the explanation centred on the interaction between gender equality in employment and the degree of secularisation (which is used as proxy for a less traditional family system).²

This paper is structured as follows. Section 2 reviews the literature related to gender equality and fertility. Section 3 explains the data and method used in the analysis. Section 4 presents the results of the analysis and finally Section 5 concludes by summarising the main findings and implications.

2 Related literature

The "demographic transition theory" (e.g. Kirk 1996) defined the fertility transition as a decline of fertility from high levels to the replacement level, thus identifying the latter as the end-point of this process. Several theories have been proposed within the economic literature to explain these fertility transitions (e.g. see Guinnane 2011) and various empirical studies have analysed their potential relevance (e.g. Murin 2013). The factors that have been identified and emphasised are related to socio-economic development and health improvements. In these frameworks higher women's labour market participation and lower gender gaps - that can be triggered by technological change (Galor and Weil 1996) - are associated to a higher opportunity cost of childbearing and, hence, a fertility decline (e.g. Galor 2012).

Various empirical studies have found evidence of a reversal in the relationship between socio-economic development and fertility, which is particularly relevant to understand/explain the decline of fertility below replacement level and its (eventual) recovery. Myrskälä et al. (2009) suggest that at very high levels of development - measured with the Human Development Index - increases in development tend to be positively related to fertility whereas at lower levels of development a negative relationship persists; that is, there is an inverse J-shaped relationship between socio-economic development and fertility. Luci and Thevenon (2010), also using country-level data, have found a U-shaped relationship between economic development (GDP per capita) and fertility.³ The find-

²This evidence is consistent with other studies, such as Kertzer et al. (2009), suggesting that cultural factors - beside economic ones - are likely to be relevant in explaining fertility behaviour in Italy.

³Fox et al. (2015) provide evidence of a similar relationship between economic development and fertility at the regional level in Europe.

ings of Myrskälä et al. (2009) have been explained by linking the positive impact of increases in development on fertility to gender equality (Myrskälä et al. 2011). Similarly, Luci and Thevenon (2010) have identified women's employment as a key determinant of the positive part of the relationship. This cross-country evidence is consistent with the observation of a reversal (from negative to positive) during recent decades of the correlation between fertility and women's labour force participation across developed nations (e.g. Ahn and Mira 2002).⁴

Gender equality has been identified as a central component of theoretical frameworks that aim to explain fertility behaviour, in particular changes and/or differences in fertility. A common theoretical approach identifies a gender transition that takes place through various phases (e.g. Baizan et al. 2016). Initially, an increase in women's labour market participation in the absence of a corresponding institutional change (in terms of norms and policies) results in a reduction of fertility. In intermediate stages, the first institutional adaptation - to higher gender equality in employment - occurs in terms of policies (e.g. coverage of childcare services). Subsequently, also norms, in particular regarding gender roles within the family, evolve in a way such that also men contribute to domestic tasks and childcare.⁵ The final stage is one in which a fully egalitarian family model becomes the norm.⁶

Both theory and evidence suggest that (aspects related to) gender equality can be particularly relevant in explaining recent fertility patterns in many developed countries. We proceed by discussing in more detail the role of gender equality in employment and of the factors that can affect its impact on fertility.

⁴A role in explaining this positive correlation can be played also by labour market arrangements, for example those that favour job stability and flexibility (e.g. part-time employment) as suggested by Adsera (2004).

⁵Garcia-Manglano et al. (2015), using time diary data, suggest that a more gender egalitarian distribution of house production can explain why some developed nations have been able to maintain - or to bring back - fertility rates close to replacement level.

⁶A transition to more egalitarian norms would also foster fertility by favouring household formation (e.g. Sevilla-Sanz 2010).

2.1 Gender equality in employment and fertility

The effect of women’s employment on fertility has been traditionally modelled using a microeconomic framework (e.g. Becker 1981) in which the assumed division of labour leads to different degrees of specialisation in labour market activities for men and women. In particular, the optimal allocation is identified as one in which women allocate their time between paid work and household production (including childcare) whereas men allocate all their time to market work (e.g. Joshi 1998). One implication would be that better working opportunities for women would trigger a substitution effect (which dominates the income effect) leading to an increase in women’s employment and a reduction in fertility. This approach implicitly embodies an unequal distribution/allocation of ”family work” (i.e. paid work, household tasks, childcare) which is typically associated with the male-breadwinner and female-houseworker family system (e.g. Esping-Andersen and Billari 2015).⁷ In such a scenario there is no - or a very limited - possibility for men to substitute women in performing domestic tasks. The implication that follows is that an increase in gender equality in employment in contexts where gender roles within the family remain close to the ”traditional” model would lead to a reduction in fertility. This situation is likely to occur at relatively low levels of gender equality in the labour market.

As women’s employment increases (becoming similar to men’s) and social norms adapt to the changing role of women (and men), the family system would adapt as well to incorporate a more flexible and gender-equal allocation/distribution of housework (e.g. Joshi 1998).⁸ This process is likely to be slow as the family system is largely affected by religion, an institution that is resistant/averse to change (McDonald 2000).⁹ Hence, when equality in gender roles within the household has reached

⁷This family model has been favoured by the institutional/policy environment in Southern European countries (e.g. Karamessini 2008). Italy is a country characterised, on average, by a relatively unequal distribution of domestic tasks and relatively rigid gender roles (e.g. Anxo et al. 2007; Garcia-Mangano et al. 2015), with evidence of tension between women’s employment and childbearing (Matysiak and Vignoli 2013). Within the European Union (EU), Italy is one of the countries with the lowest women’s employment rate and the largest gender gap in employment (European Commission 2017) which is indicative of the prevailing social norms that see women as the main contributor to domestic tasks, thus limiting their involvement in the labour market.

⁸The modelling of the household decision-making process has also incorporated other deviations with respect to the Beckerian theory, such as non-cooperative intra-household behaviour (Joshi 1998). In this respect, cultural norms can affect the bargaining power of the family members and the outcome in terms of division of labour (e.g. Baizan et al. 2016).

⁹In the case of Italy, the Catholic religion would represent the dominant force that has shaped norms regarding

relatively high levels, increases in gender equality in employment would tend to promote higher fertility.¹⁰ This because the higher symmetry within the family in terms of gender roles allows for men to compensate women's lower involvement in household production (which lessen the negative impact of the substitution effect for women as this applies - or is partly transferred - to men) whereas the positive income effect is still present (and might increase as/if women's occupational segregation diminishes).

The above argument is consistent with a U-shaped relationship between gender equality and fertility that has been discussed in various studies (e.g. McDonald 2000; Aassve et al. 2012; Esping-Andersen and Billari 2015). This shape can result from the interaction between (changes in) gender equality in employment opportunities and (changes in) norms that affect gender roles within the family.¹¹ However, there are other possible explanations for such convex relationship. One potential factor is related to (family) policies that aim at making work and motherhood more compatible for women and increase men's involvement in childcare (and potentially housework), such as those about childcare services and maternal/paternal leave (e.g. Goldstein et al. 2009; Neyer and Andersson 2008; Baizan et al. 2016; Greulich et al. 2016; Kluge and Tamm 2013; Bünning 2015). In particular, the interaction between gender equality in employment and availability of non-family related (i.e. state- or market-provided) childcare services could also generate this non-linear relationship. In contexts where women's employment is low and mothers are expected to fully provide for the care of a child, the provision of alternative childcare services is likely to be low. Hence, an increase in gender equality in employment will make more difficult for women to combine both market work and motherhood, thus leading to a reduction in fertility. However, over time institutional adaptation in the form of diffuse availability of alternative childcare services would allow for increases in women's employment to promote higher fertility (e.g. Baizan et al. 2016).¹²

the family. In particular, a strong attachment to Catholic norms can be linked to more traditional family behaviours (De Rose et al. 2008). Hence, the degree of secularisation can be seen as an indicator/proxy of a movement away from the traditional family model.

¹⁰Arpino and Tavares (2013) find evidence consistent with this argument. Using regional (NUTS-1) data for several European countries (with a focus on Spain and Italy) about attitudes toward gender equity in the labour market and in the household, they find that both are needed to increase fertility.

¹¹Arpino et al. (2015) find a U-shaped relationship between changes in gender role attitudes and fertility at the country level using data on 27 European countries.

¹²Availability of affordable childcare has been linked to women's labour force participation and fertility in Italy (Del Boca 2002).

The argument related to the availability of childcare services is further developed in Aassve et al. (2012) by considering the role that the degree of generalised trust might play. In particular they argue that, in contexts where trust in other individuals is low, outsourcing of childcare to institutions other than the family will be low (and the development of these institutions would be slow).¹³ Thus, if gender equality in employment increases, reconciling market work and childrearing will be harder and fertility will be reduced. On the other hand, in contexts where generalised trust is high, the use of alternative (to the family) childcare services would be widespread thus facilitating both women’s employment and motherhood. Hence this argument is also consistent with a U-shaped relationship between gender equality in employment and fertility, the non-linearity being explained by the level of trust in a society.

3 Method and data

We analyse the relationship between gender equality in employment and fertility in Italy by using yearly province-level data and panel fixed-effects regressions.¹⁴ Provinces correspond to geographical/administrative areas at the NUTS-3 level which represents the lowest level of aggregation within the EU classification system.¹⁵

The panel data cover 110 provinces over the period 2004-2015 for the baseline analysis but for some of the robustness checks, because of data availability, the time period covered is shorter (i.e. 2004-2012). The panel is unbalanced as some of the provinces enter the panel after 2004 due to administrative changes (e.g. related to the creation of new provinces or to the shift of municipalities from one province to another/other province(s)).¹⁶

¹³In the context of Italy, the use of informal childcare has been diffused but the limited use of non-familial childcare services has been related to their availability and costs (e.g. Del Boca et al. 2005). The argument of Aassve et al. (2012) provides a competing (or complementary) explanation.

¹⁴Other studies have used province-level panel data to analyse aspects related to fertility in Italy (e.g. Vitali and Billari 2017).

¹⁵See <http://ec.europa.eu/eurostat/web/nuts/overview>. To clarify the different degree of aggregation, NUTS-1 level data used, for example, in Arpino and Tavares (2003) consist, for Italy, of 5 macro-regions whereas the NUTS-3 level data used in this paper comprehend 110 provinces.

¹⁶The following provinces enter the panel in 2006: Carbonia-Iglesias, Medio Campidano, Ogliastra, Olbia-Tempio, Cagliari, Nuoro, Sassari, Oristano. The following provinces enter the panel in 2010: Monza e della Brianza, Milano, Barletta-Andria-Trani, Bari, Foggia, Fermo, Ascoli Piceno, Pesaro e Urbino, Rimini.

3.1 Method

The main empirical model is specified as follows:

$$TFR_{i,t} = \alpha_1 WMERR_{i,t-1} + \alpha_2 WMERR_{i,t-1}^2 + \alpha_3 x_{1i,t-1} + \alpha_4 x_{2i,t-1} + \dots + \alpha_k x_{ki,t} + \gamma_i + \delta_t + \epsilon_{i,t} \quad (1)$$

where $TFR_{i,t}$ is the total fertility rate in province i in year t , $WMERR_{i,t-1}$ is the indicator of gender (in)equality in employment in province i in year $t-1$, $x_{1i,t-1}, x_{2i,t-1}, \dots, x_{ki,t}$ represent various lagged or contemporaneous control variables, γ_i are province-fixed effects, and δ_t are year dummies.

Most independent variables are included in the model with a time-lag. The rationale for this is that we expect most births that occur in a given year to be the result of decisions that took place in the previous year, and hence they depend on (or were affected by) conditions in that year. Further, this helps in reducing potential bias due to reverse causality (i.e. from fertility to the independent variables).

We use year dummies to capture the effect of national-level events that can affect fertility in each year. Province-fixed effects are included to account for unobserved heterogeneity due to time-invariant province characteristics that can be relevant in explaining fertility. Hence, fixed effects help to control for potentially relevant omitted variables that do not change over time (Angrist and Pischke 2009). However, one has to acknowledge that other sources of endogeneity might bias the estimates of fixed effects models and, as a consequence, we should interpret with caution the results of our analysis. The latter provides suggestive evidence about the relationship of various factors with fertility, but it cannot be given causal interpretation.

3.2 Data

The dependent variable, fertility, is measured using the period (annual) TFR in each province. The degree of gender (in)equality in the labour market is measured using the women-to-men employment rate ratio (WMERR), that is, women's employment rate divided by men's employment rate, multiplied by 100. We include various independent variables that help in accounting for potential

determinants of fertility. We use as proxy for economic development the Gross Value Added (GVA) per capita.¹⁷ We measure the degree of secularisation using the percentage share of civil marriages and of out-of-wedlock births. These indicators, which capture the adherence or not to Catholic values, are also used as proxies for (changes in) norms regarding gender roles within the family as the latter are linked to religion (McDonald 2000). Regarding childcare services, we use two indicators. First, a measure of the availability/coverage of childcare services, that is the percentage share of municipalities (out of all municipalities in each province) that have activated childcare services.¹⁸ Second, a measure of the utilisation of such childcare services, that is the percentage share of children aged 0-3 that have utilised childcare services.¹⁹ We use the TFR of women with non-Italian citizenship or the share of births from foreign parents to control for the role of immigration as immigrants tend to have (preferences for) relatively higher fertility (e.g. Caltabiano et al. 2009). Finally, to perform some additional checks, we use data on the mean age at childbirth.

Table 1 identifies the time coverage and the source of dependent and independent variables.²⁰ Table 2 shows some descriptive statistics (i.e. the mean) for the main variables used in our analysis.

Table 1: Variables: sources and time coverage

Variable	Source	Time coverage
TFR (all/foreign)	http://dati.istat.it/	2005-2015
WMERR	author's calculations using data from http://www.istat.it/storage/politiche-sviluppo/Lavoro_P.xls	2004-2014
Civil marriages (%)	http://dati.istat.it/	2004-2014
Out-of-wedlock births (%)	http://dati.istat.it/	2004-2014
GVA per capita	http://www.ucer.camcom.it/studi-ricerche/banche-dati/bd/contieco/province/valaggiu/Valore_aggiunto_pro_capite_2001_2011.xls/at_download/file	2004-2014
Childcare services (coverage/usage)	http://www.istat.it/storage/politiche-sviluppo/Servizi_cura_P.xls	2004-2012
Births from foreign parents (%)	http://dati.istat.it/	2005-2015
Mean age at childbirth	http://dati.istat.it/	2005-2015

¹⁷GVA is measured at current market prices.

¹⁸Data on this indicator is not available for the province of Bolzano.

¹⁹Data on both indicators related to childcare services are available up to 2012. Hence, when we include these variables in the empirical model, the number of observations is lower compared to our baseline regressions.

²⁰Note that, because of the specification of the empirical model, the last data used for the independent variables that are time-lagged is 2014 whereas for the dependent variable and the contemporaneous independent variables the first data used is in 2005.

Table 2: Descriptive statistics: mean

<i>Year</i>	2005	2015
TFR (all women)	1.2992	1.3114
Mean age at childbirth (all)	30.8380	31.6928
TFR (foreign)	2.7576	1.905
Share births foreign parents	9.5651	14.0442
N (provinces)	93	110
<i>Year</i>	2004	2014
WMERR	65.5196	71.201
Civil marriages (%)	33.2795	44.21
Out-of-wedlock births (%)	14.3035	28.4917
GVA per capita	21324.08	21872.6
N (provinces)	93	110
<i>Year</i>	2004	2012
Childcare services (coverage, %)	42.7054	57.8596
Childcare services (usage, %)	12.4365	12.6354
N (provinces)	92 (93)	109 (110)

4 Results

A preliminary look at the unconditional correlation between gender equality in employment and fertility (see Figure 1) suggests the possible presence of a U-shaped relationship.²¹ We proceed by assessing whether this relationship is robust to controlling for various factors that can affect fertility.

4.1 Gender equality in employment and fertility: panel data analysis

Table 3 shows the results of our baseline regressions. We start by assessing the relationship between the WMERR and fertility without any additional control variables (Column 1) and then allowing for a non-linear relationship by including the WMERR squared (Column 2). The evidence suggests that the U-shaped relationship identified in the pooled data is robust to controlling for province fixed-effects and year dummies (Column 2) and for GVA per capita (Columns 3-4). Further, the

²¹The figure uses pooled data for available provinces and years that correspond to our baseline panel dataset.

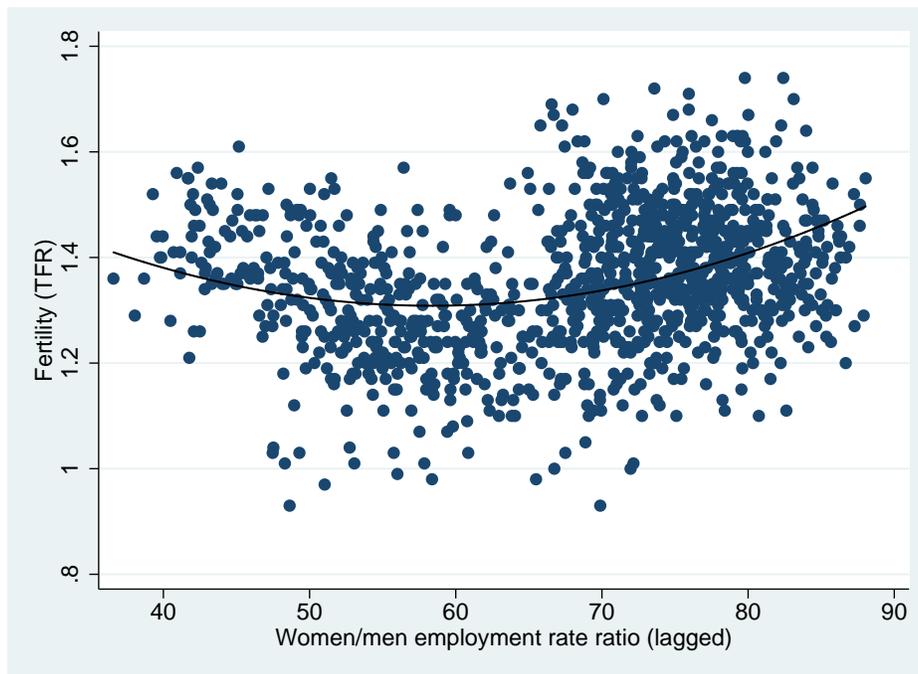


Figure 1: Gender (in)equality in employment and fertility

evidence suggests a similar convex relationship between economic development and fertility, in line with the existing country-level (e.g. Luci and Thevenon 2010), regional-level (e.g. Fox et al. 2015), and province-level (e.g. Vitali and Billari 2017) evidence.²² The coexistence of a significant convex relationship with both gender equality in employment and economic development suggests that both aspects are likely to have independent effects on fertility. Also, this finding tends to indicate a general U-shaped relationship between socio-economic development and fertility.

We assess whether the U-shaped relationship between the WMERR and fertility is robust to the inclusion of other potential determinants of fertility (Table 4). First, we control for the role of immigration by using the TFR of women with foreign citizenship (Column 1) or the share (%) of live births from foreign parents (Column 2). Second, we account for the possible role played by secularisation with the inclusion of two indicators: the share (%) of out-of-wedlock births (Column 3) and the share (%) of civil marriages (Column 4). Finally, we control for the role of the availability

²²Vitali and Billari (2017) include a measure of gender gaps in employment in their empirical model but they do not directly analyse the potential existence of a general U-shaped relationship between gender equality in employment and fertility (and its possible explanations). Within their analysis, which covers the period 1999-2010, they find a general non-significant relationship between gender gaps in employment and fertility (as we do - Table 3, Column 1) and they identify some geographical patterns - e.g. for the year 2010 - that could be partially in line with our findings.

(Column 5) or utilisation (Column 6) of non-familial childcare services. The evidence confirms our previous findings. We also notice that both immigration and secularisation are significantly associated to higher fertility whereas availability and utilisation of childcare services do not display a significant relationship with fertility.

Overall the evidence presented in Tables 3-4 is consistent with the existence of a convex relationship between gender equality in employment and fertility.²³ The next step of our analysis involves the assessment of possible explanations for this U-shaped relationship.

Table 3: Gender equality and fertility: baseline regressions

	(1)	(2)	(3)	(4)
WMERR _{t-1}	0.00055 [0.00044]	-0.01653*** [0.00267]	-0.01612*** [0.00265]	-0.01628*** [0.00280]
WMERR _{t-1} ²		0.00013*** [0.00002]	0.00013*** [0.00002]	0.00013*** [0.00002]
(Ln)GVA per capita _{t-1}			0.08085 [0.05584]	-8.26850*** [1.55054]
(Ln)GVA per capita _{t-1} ²				0.42031*** [0.07786]
Fixed effects	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Provinces	110	110	110	110
Observations	1142	1142	1142	1142
R ² (within)	0.46666	0.50091	0.50322	0.52547

***, **, * denotes statistical significance at 1% , 5% and 10% levels, respectively. Constant included in all regressions. Dependent variable: total fertility rate (all women). Robust standard errors clustered at the province level reported in parentheses.

²³The eventual postponement of births by women to older ages, by generating a "tempo-effect", can affect the period TFR (e.g. Bongaarts and Sobotka 2012). If we include the mean age at childbirth (i.e. a direct measure of the postponement of childbearing) among the control variables, regression results (not reported) are qualitatively identical to those shown in Tables 3-4.

Table 4: Gender equality and fertility: robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)
WMERR _{t-1}	-0.01336*** [0.00338]	-0.01231*** [0.00257]	-0.01251*** [0.00310]	-0.01092*** [0.00313]	-0.01269*** [0.00378]	-0.01281*** [0.00378]
WMERR _{t-1} ²	0.00011*** [0.00002]	0.00010*** [0.00002]	0.00010*** [0.00002]	0.00009*** [0.00002]	0.00010*** [0.00003]	0.00010*** [0.00003]
(Ln)GVA per capita _{t-1}	-7.77808*** [1.44755]	-6.46668*** [1.46864]	-7.03334*** [1.39924]	-7.22511*** [1.45214]	-8.88577*** [1.58592]	-7.85969*** [1.78018]
(Ln)GVA per capita _{t-1} ²	0.39291*** [0.07249]	0.33114*** [0.07382]	0.35650*** [0.07019]	0.36588*** [0.07260]	0.44786*** [0.07939]	0.39549*** [0.08937]
TFR foreign _t	0.04480*** [0.00900]		0.04510*** [0.00861]	0.04567*** [0.00878]	0.03678*** [0.00860]	0.03731*** [0.00875]
Births foreign parents (perc.) _t		0.01096*** [0.00167]				
Out-of-wedlock births (perc.) _{t-1}			0.00434*** [0.00113]		0.00503*** [0.00128]	0.00446*** [0.00134]
Civil marriages (perc.) _{t-1}				0.00295*** [0.00085]		
Childcare services (coverage) _{t-1}					0.00014 [0.00014]	
Childcare services (usage) _{t-1}						0.00031 [0.00055]
Fixed effects	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes
Provinces	110	110	110	110	109	110
Observations	1142	1142	1142	1142	913	922
R ² (within)	0.56355	0.57798	0.58044	0.57665	0.60216	0.58974

***, **, * denotes statistical significance at 1%, 5% and 10% levels, respectively. Constant included in all regressions. Dependent variable: total fertility rate (all women). Robust standard errors clustered at the province level reported in parentheses.

4.2 Gender equality in employment and fertility: interactions

We analyse various potential explanations for the U-shaped relationship between gender equality in employment and fertility. Firstly, we consider the role of (cultural) norms. We start from the assumptions that the "family system" is strongly affected by factors such as religion and it has a tendency to be persistent and change slowly (McDonald 2000), and that a strong attachment to Catholic values can be associated to more traditional family behaviours (e.g. De Rose et al. 2008). We use the degree of secularisation - i.e. out-of-wedlock births and civil marriages - as proxy for a

(change in the) social/family environment that is potentially more favourable to accept less rigid gender roles within the family and hence a more flexible gender division of housework. Our strategy is to test whether the interaction between gender (in)equality in employment and the degree of secularisation explains the U-shaped relationship between gender equality in employment and fertility. Table 5 (Columns 1-2) shows the results of regressions that include this interaction term (and exclude the WMERR squared). We see that, independently of the indicator of secularisation, the inclusion of the interaction term allows to replicate (and hence explain) the convex relationship. In particular, the combination of relatively high gender equality (i.e. low gender gaps) in employment and secularisation tends to increase fertility. Secondly, we consider the possible role of non-familial childcare services. The combination of relatively high gender equality in employment and availability of childcare services can also explain the positive part of the U-shaped relationship. Table 5 (Column 3) displays the regression results when we include an interaction term to capture this potential effect; we observe that there is some evidence in line with this argument but it appears to be weaker and less significant. However, it could be that what matters is not the presence of institutions that offer childcare services, but the actual utilisation of such services.²⁴ We test for this explanation by considering again an interaction between the relevant variables: the combination of relatively high gender equality in employment and utilisation of childcare services could explain the positive part of the U-shaped relationship. Table 5 (Column 4) shows the regression results when we include the relevant interaction term. Also in this case we observe some evidence in line with the above line of thought but, as in Column 3, it is weaker and less significant.

The evidence provided in Table 5 suggests that the interaction/interplay between gender equality in employment and degree of secularisation is a plausible explanation of the observed U-shaped relationship between gender equality in employment and fertility. The evidence in favour of other explanations, based on the availability or utilisation of childcare services, is less strong/robust.²⁵

²⁴Usage can be affected by factors such as costs and, according to the argument of Aassve et al. (2012), the degree of generalised trust among individuals.

²⁵If we include the mean age at childbirth among the independent variables, results (not reported) are qualitatively identical for the regressions about the interaction between gender equality in employment and secularisation (i.e. Columns 1-2) whereas for the regressions about childcare services (i.e. Columns 3-4) the interaction term becomes less significant (Column 3 - 10% significance level) or not significant (Column 4).

Table 5: Gender equality and fertility: interactions

	(1)	(2)	(3)	(4)
WMERR _{t-1}	-0.00271*** [0.00075]	-0.00284*** [0.00094]	-0.00070 [0.00074]	-0.00104 [0.00103]
Out-of-wedlock births (perc.) _{t-1}	-0.00640*** [0.00202]		0.00555*** [0.00137]	0.00481*** [0.00141]
WMERR _{t-1} × Out-of-wedlock births (perc.) _{t-1}	0.00015*** [0.00003]			
Civil marriages (perc.) _{t-1}		-0.00381** [0.00167]		
WMERR _{t-1} × Civil marriages (perc.) _{t-1}		0.00009*** [0.00002]		
Childcare services (coverage) _{t-1}			-0.00118* [0.00064]	
WMERR _{t-1} × Childcare services (coverage) _{t-1}			0.00002** [0.00001]	
Childcare services (usage) _{t-1}				-0.00771* [0.00420]
WMERR _{t-1} × Childcare services (usage) _{t-1}				0.00011* [0.00006]
(Ln)GVA per capita _{t-1}	-6.47175*** [1.44705]	-7.20331*** [1.45073]	-8.52960*** [1.62125]	-7.85688*** [1.78407]
(Ln)GVA per capita _{t-1} ²	0.32727*** [0.07253]	0.36420*** [0.07250]	0.43022*** [0.08103]	0.39575*** [0.08929]
TFR foreign _t	0.04437*** [0.00853]	0.04564*** [0.00868]	0.04167*** [0.00816]	0.04087*** [0.00861]
Fixed effects	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Provinces	110	110	109	110
Observations	1142	1142	913	922
R ² (within)	0.58949	0.57703	0.59023	0.57762

***, **, * denotes statistical significance at 1%, 5% and 10% levels, respectively. Constant included in all regressions. Dependent variable: total fertility rate (all women). Robust standard errors clustered at the province level reported in parentheses.

5 Conclusions

We have analysed the relationship between gender equality in employment and fertility within Italy, a country characterised over the recent past by fertility well below replacement level. In particular, using province-level data, we have identified a U-shaped relationship: if gender gaps in employment are large, an increase in gender equality initially reduces fertility with the effect becoming positive only when relatively high levels of gender equality (i.e. relatively small gender gaps) are achieved. On one hand this finding is in line with recent theoretical frameworks (e.g. McDonald 2000; Esping-Andersen and Billari 2015) and evidence (e.g. Luci and Thevenon 2010). On the other, it expands the literature by providing evidence on this relationship within a specific country using regional (i.e. province-level) data.

We have also investigated potential explanations for the U-shaped relationship. The evidence suggests that the interaction between gender equality in employment and the degree of secularisation could be a relevant aspect. If a higher degree of secularisation corresponds to an environment that is more favourable (or moving towards) a more "egalitarian" family model in terms of gender roles, then this would explain why its combination with higher employment for women (i.e. higher gender equality in employment) would lead to higher fertility.

The implication that follows is that a recovery of fertility towards the replacement level could be fostered by, among other things, facilitating "cultural change" leading to a faster transition towards a more gender egalitarian family system, as suggested by Esping-Andersen and Billari (2015). This would also increase the beneficial impact of (family) policies aiming at promoting gender-equality, given that the latter are unlikely to have a sizeable impact on fertility in areas where traditional norms still prevail (e.g. Bonoli 2008).

References

- [1] Aassve, A., Billari, F. and Pessin, L. (2012). Trust and fertility dynamics. Dondena Working Papers No. 55.
- [2] Adsera, A. (2004). Changing Fertility Rates in Developed Countries. The Impact of Labor Market Institutions. *Journal of Population Economics* 17(1):17-43.
- [3] Ahn, N., Mira, P. (2002). A note on the changing relationship between fertility and female employment rates in developed countries. *Journal of Population Economics* 15(4): 667-682.
- [4] Angrist, J.D., and Pischke, J-S. (2009). *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press, Princeton, NJ.
- [5] Anxo, D., Flood, L., Mencarini, L., Pailhé, A., Solaz, A., and Tanturri, M.L. (2007). Time allocation between work and family over the life-cycle: A comparative gender analysis of Italy, France, Sweden and the United States. IZA Discussion Paper No. 3193.
- [6] Arpino, B., and Tavares, L.P. (2013). Fertility and values in Italy and Spain: a look at regional differences within the European context. *Population Review* 52(1):62-86.
- [7] Arpino, B., Esping-Andersen, G., and Pessin, L. (2015). How do changes in gender role attitudes towards female employment influence fertility? A macro-level analysis. *European Sociological Review* 31(3):370-382.
- [8] Baizan, P., Arpino, B., Delclòs, C.E. (2016). The Effect of Gender Policies on Fertility: The Moderating Role of Education and Normative Context. *European Journal of Population* 32:1-30.
- [9] Becker, G.S. (1981). *A Treatise on the Family*. Cambridge, MA: Harvard University Press.
- [10] Bloom, D.E., Canning, D., and Sevilla, J. (2001). Economic Growth and the Demographic Transition. *NBER Working Paper No. 8685*.
- [11] Bongaarts, J., and Sobotka, T. (2012). A demographic explanation for the recent rise in European fertility. *Population and Development Review* 38(1):83-120.

- [12] Bonoli, G. (2008). The impact of social policy on fertility: Evidence from Switzerland. *Journal of European Social Policy* 18(1):64-77.
- [13] Bünning, M. (2015). What Happens after the 'Daddy Months'? Fathers' Involvement in Paid Work, Childcare, and Housework after Taking Parental Leave in Germany. *European Sociological Review* 31(6):738-748.
- [14] Caltabiano, M., Castiglioni, M., and Rosina, A. (2009). Lowest-low fertility: signs of a recovery in Italy? *Demographic Research* 21:681-718.
- [15] De Rose, A., Racioppi, F., and Zanatta, A.L. (2008). Italy: delayed adaptation of social institutions to changes in family behaviour. *Demographic Research* (Special Collection 7) 19:665-704.
- [16] Del Boca, D. (2002). The Effects of Child Care and Part Time on the Participation and Fertility Decisions in Italy. *Journal of Population Economics* 15:549-573.
- [17] Del Boca, D., Locatelli, M., Vuri, D. (2005). Child-Care Choices by Working Mothers: The Case of Italy. *Review of Economics of the Household* 3:453-477
- [18] Esping-Andersen, G., and Billari, F.C. (2015). Re-theorizing Family Demographics. *Population and Development Review* 41(1):1-31.
- [19] European Commission (2017). 2017 Report on equality between women and men in the EU. European Union. (http://ec.europa.eu/newsroom/document.cfm?doc_id=43416)
- [20] Fox, J., Klüsener, S., Myrskylä, M. (2015). Is a Positive Relationship between Fertility and Economic Development Emerging at the Sub-National Regional Level? Theoretical Considerations and Evidence from Europe. Max Planck Institute for Demographic Research, Working Paper No. 2015-006.
- [21] Galor, O. (2012). The demographic transition: causes and consequences. *Cliometrica* 6:1-28.
- [22] Galor, O., and Weil, D.N. (1996). The gender gap, fertility, and growth. *American Economic Review* 86(3):374-387.

- [23] García-Manglano, J., Nollenberger, N., and Sevilla, A. (2015). Gender, Time-Use, and Fertility Recovery in Industrialized Countries. *International Encyclopedia of the Social & Behavioral Sciences*, 2nd edition, Volume 9, pp. 775-780.
- [24] Goldstein, J.R., Sobotka, T., and Jasilioniene, A. (2009). The end of "lowest-low" fertility? *Population and Development Review* 35(4):663-699.
- [25] Greulich, A., Thevenon, O., and Guergoat-Larivière, M. (2016). Securing women's employment: a fertility booster in European countries? CES Working Papers 2016.24.
- [26] Guinnane, Timothy W. (2011) The historical fertility transition and theories of long-run growth: a guide for economists. *Journal of Economic Literature* 49:589-614.
- [27] Joshi, H. (1998). The opportunity costs of childbearing: more than mothers' business. *Journal of Population Economics* 11:161-183.
- [28] Karamessini, M. (2008). Continuity and change in the southern European social model. *International Labour Review* 147(1): 43-70.
- [29] Kertzer, D.I., White, M.J., Bernardi, L., and Gabrielli, G. (2009). Italy's Path to Very Low Fertility: The Adequacy of Economic and Second Demographic Transition Theories. *European Journal of Population* 25:89-115.
- [30] Kirk, D. (1996). Demographic Transition Theory. *Population Studies* 50:361-387.
- [31] Kluge, J. and Tamm, M. (2013). Parental leave regulations, mothers' labor force attachment and fathers' childcare involvement: evidence from a natural experiment. *Journal of Population Economics* 26:983-1005.
- [32] Lesthaeghe, Ron (1983). A Century of Demographic and Cultural Change in Western Europe: An Exploration of Underlying Dimensions. *Population and Development Review* 9(3):411-435.
- [33] Luci, A., and Thèvenon, O. (2010). Does economic development drive the fertility rebound in OECD countries. INED working paper No. 167.

- [34] Matysiak, A, and Vignoli, D. (2013). Diverse Effects of Women’s Employment on Fertility: Insights From Italy and Poland. *European Journal of Population* 29:273-302.
- [35] McDonald, P. (2000). Gender equity in theories of fertility transition. *Population and Development Review* 26(3):427-439.
- [36] Murtin, F. (2013). Long term determinants of the demographic transition: 1870-2000. *Review of Economics and Statistics* 95:617-631.
- [37] Myrskylä, M., Kohler, H-P. and Billari, F.C. (2009). Advances in development reverse fertility declines. *Nature* 460:741-743.
- [38] Myrskylä, M., Kohler, H.-P., and Billari, F.C. (2011). High Development and Fertility: Fertility at Older Reproductive Ages and Gender Equality Explain the Positive Link. Population Studies Center, University of Pennsylvania, PSC Working Paper Series 11-06.
- [39] Neyer, G.R., and Andersson, G. (2008). Consequences of family policies on childbearing behavior: effects or artifacts? *Population and Development Review* 34(4):699-724.
- [40] Reher, D.S. (2004). The demographic transition revisited as a global process. *Population, Space and Place* 10:19-42.
- [41] Sevilla-Sanz, A. (2010). Household division of labor and cross-country differences in household formation rates. *Journal of Population Economics* 23:225-249.
- [42] Smeeding, T.M. (2014). Adjusting to the fertility bust. *Science* 346:163-164.
- [43] United Nations Population Division (2015). *World Population Prospects: The 2015 Revision*. (Data available at: <https://esa.un.org/unpd/wpp/>)
- [44] van de Kaa, Dirk J. (2002). The Idea of a Second Demographic Transition in Industrialized Countries. Paper presented at the Sixth Welfare Policy Seminar of the National Institute of Population and Social Security, Tokyo, Japan, 29 January.
- [45] Vitali, A., and Billari, F.C. (2017). Changing Determinants of Low Fertility and Diffusion: a Spatial Analysis for Italy. *Population, Space and Place* 23:1-18.