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Trust and Fertility: Evidence from OECD countries

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Abstract

Using panel data for 24 (OECD) countries during the period 1980–2004 this study examines how social trust affects fertility. The major finding through the random effects approach is that the social trust increases the fertility rate. A 1% rise in the trust rate leads to an increase in fertility by 0.01 points. The results presented here suggest that in developed countries, trust underlies the desirable circumstances for child rearing.

Running title: Trust and fertility

Keywords: Trust, fertility, OECD, inequality, female labor participation.
JEL classification: J13, Z13

I. INTRODUCTION

As a consequence of the declines experienced in most OECD countries, fertility rates[1] have fallen below the level needed to ensure generational replacement (roughly 2.1 children per woman) (Sleebos, 2003). The few countries with fertility rates above this replacement value include Mexico and Turkey (at 2.2 children per woman), and Iceland and the United States (at 2.1 children per woman) (OECD, 2009). Decreased fertility is thought to influence social and economic conditions. From an economic view point, low fertility rates lead to a reduction in the working-age population, which in turn hampers economic growth[2]. It must also be recognized that fertility and economic growth are linked endogenously and thus influence each other.

Economic growth depends in part on input factors, such as labor and capital. On the other hand, the socio-economic background of society is considered to contribute to economic growth. For instance, the role played by trust has been given much attention by researchers (La Porta et al., 1997; Uslaner, 2002, Bjørnskov, 2006, 2010, 2011; Berggren and Jordahl, 2006; Huang et al., 2009; Sabatini, 2008, 2009)[3]. The existing literature shows that social trust accelerates economic growth (Knack and Keefer, 1997; Algan and Cahuc, 2010). There are several potential channels through which social trust enhances economic growth. For instance, the classical work of Zak and Knack (2001) suggests that social trust improves efficiency by alleviating the moral hazard problem, resulting in increased investment and thus economic growth. Bjørnskov (2011) provided evidence of a transmission mechanism whereby trust influences schooling and the rule of law directly, and that this affects economic growth. This argument is in part supported by

[1] The total fertility rate represents the ratio between the number of births in a given year and the average number of women of reproductive age (15-49 years).
[2] There is empirical evidence in the literature suggesting an inverse relationship between fertility and the growth rate of per capita income (Barro, 1991).
[3] Social trust is regarded as a form of social capital (Putnam, 1993, 2000).

evidence that social trust enhances human capital formation (Papagapitos & Riley, 2009; Bjørnskov, 2009; Yamamura, 2011).

In discussions about the fertility rate in developed countries, such as those in the OECD, it is important to consider "trade-offs confronting individual women between having children, on one side, and taking advantage of the education and employment opportunity available to them" (Sleebos, 2003, p. 19). Women's decisions regarding fertility depend on the economic costs and benefits (Becker, 1981). Hence a rise in women's wage level increases the opportunity cost of giving birth and childcare (Galor and Weil, 1996). One of the costs of fertility for working women is finding a reliable nursery, and so supply of childcare services is important (Apps and Rees, 2004; Martinez and Iza, 2004). However, there seems to be a principal–agent problem between parents and childcare workers, because the behavior of childcare workers cannot be well monitored by the parents (Milgrom and Roberts, 1992). Housewives also confront a similar situation. Children go to school, where they learn from the teachers. However, the behavior of teachers cannot be monitored by the parents, resulting in a principal–agent problem. Due to this problem, parents appear to spend much time searching for a 'good' nursery (or school), and so search costs are high. As a consequence, the childcare and education markets cannot function well, which increases the cost of having a child.

Principal–agent problems are less important in high-trust societies (North, 1990, pp. 32-33). High social trust is negatively correlated with the likelihood of principal–agent problems[4]. Therefore, nursery and education markets function well in high-trust societies. The cost of searching for nurseries and schools is thus higher in a distrustful society than in a trustful society.

[4] Trust can be distinctly divided into particularized trust and generalized trust (Uslaner, 2002). Generalized trust is defined as 'the perception that *most* people are part of your moral community' (Uslaner, 2002, p.26). On the other hand, 'Particularized trusters have positive views of their own in-group and negative attitudes toward groups to which they do not belong' (Uslaner, 2002, p. 28). In this paper, we define social trust to be equivalent to generalized trust.

All in all, these implications lead us to conclude that social trust increases fertility. However, little is known about the relationship between social trust and fertility, and it would be worthwhile to investigate this relationship. The purpose of this paper is to explore how and to what extent social trust increases fertility rates using panel data from 24 OECD countries.

The organization of this paper is as follows. An explanation of the data set is provided in Section II. Section III presents a simple econometric framework. The results of the estimations and a discussion are provided in Section IV. The final section offers concluding observations.

II. DATA AND HYPOTHESIS

This study uses panel data covering the 24 year period 1980–2004. As shown in Table A1 in the Appendix, 24 OECD countries are used in this study, including all 20 original OECD members. With the exception of South Korea, the other countries included in this study joined the OECD prior to 1980.

This paper uses data from several sources. Crude birth rates are taken from the World Bank's World Development Indicators Database (World Bank, 2006). Among the set of explanatory variables are: trust, income, divorce rate, unemployment rate and income inequality. Our key variable for trust is taken from the World Values Survey (WVS)[5]. Trust is measured by the proportion of people who think that most people can be trusted. This proxy for trust has previously been used in various studies to represent generalized trust (Leigh, 2006; Bjørnskov, 2007, 2009; Uslaner, 2002). The WVS has been conducted five times between 1981 and 2005. However, the year when WVS was conducted varies according to country which is why that there is no panel-structured

[5] The data is available from http://www.worldvaluessurvey.org (accessed on Jan 10, 2011).

data for trust. The value of trust provided by WVS is a well-functioning and reliable measure, and is remarkably stable within a country over time (Bjørnskov, 2007; Uslaner, 2002). Hence, we use mainly data collected in 1990, since this is close to the mid-point of the period studied in this paper[6].

As a measure of income, we use the per capita real gross domestic product adjusted for purchasing power parity (PPP, expressed in constant 2000 US dollars) taken from the Penn World Tables (PWT 6.3) (Heston et al., 2009)[7]. Income inequality is measured by Gini coefficients extracted from the Standardized Income Inequality Database (Stolt, 2009). Harmonized unemployment rates are taken from the OECD database[8]. We also use the female labor participation rate (as a percentage of the total labor force) taken from the World Bank's World Development Indicators Database (World Bank, 2006), and crude divorce rates (per 1,000 people) are taken from the United Nations Common Database, Demographic Yearbook[9].

It was reported in Sleebos (2003) that the average fertility rate across countries has declined during the period 1980–2003, as plotted in Figure 1. Regarding average GDP, we observe from Figure 2 that GDP has increased monotonically in the same period. Combining these observations from Figures 1 and 2, we infer that GDP growth results in decreased fertility[10]. GDP growth seems to be positively associated with wage rate. Therefore, this is consistent with the argument that the high opportunity cost of giving

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[6] WVS was not conducted in 1990 for some countries and so we used the data for a different year as follows. Data for New Zealand was collected in 1998, for Australia in 1995, for Switzerland in 1989 and for Greece in 1999.
[7] This can be downloaded from http://pwt.econ.upenn.edu/php_site/pwt_index.php.
[8] Available from http://stats.oecd.org (accessed on May 10, 2010).
[9] Available from http://data.un.org/Default.aspx (accessed on May 10, 2010).
[10] The reverse causality is unlikely to hold. This is because a decline in fertility rates results in a reduction in the labor force. If this is so, then lower fertility rates mean lower economic growth rates. However, Figures 1 and 2 together do not suggest such relation.

birth reduces the incentive to have a child (Becker, 1981).

The average fertility rate between 1980 and 2004 is displayed on the vertical axis in Figure 3, which shows that fertility rates vary considerably across countries. The highest fertility rates are reported in Ireland (2.2), Iceland (2.1) and New Zealand (2.0). The lowest fertility rates are found in Italy (1.32), Germany (1.36) and Spain (1.43). On the other hand, we also observe the large variation in the trust rate between countries. The countries with the highest rate of social trust, around 60%, includes Scandinavian countries such as Norway, Sweden and Finland, while the lowest rate, approximately 20%, contains Mediterranean countries such as France and Portugal. Figure 3 reveals that trust rates are positively associated with fertility rates.

III. METHODOLOGICAL APPROACH AND MODEL

We estimate the determinants of fertility rates and use the panel data for OECD countries to control for the unobservable year-specific and country-specific effects. Following Narayan and Peng (2001) and Masih and Masih (2000), the estimated reduced model takes the following form:

$$FERTIL_{it} = \alpha_1 TRUST_t + \alpha_2 INCOM_{it} + \alpha_3 UNEMP_{it} + \alpha_4 GINI_{it} + \alpha_5 FLAB_{it} + \alpha_6 DIV_{it} + k_t + \varepsilon_i + \omega_{it}, \quad (1)$$

where $FERTIL$ is the (total) fertility rate of country i in year t, and α represents the regression parameter. The variable k_t represents the unobservable year-specific effects of year t, which is controlled for by dummy variables. ε_i and ω_{it} represent the individual effects for country i (a time-invariant fixed effect vector) and the error term for country i in year t, respectively. The fixed effects of ε_i can be captured by the fixed effects

approach (Baltagi, 2005). However, *TRUST* is also assumed to be time-invariant and so is captured by ε_i. That is, *TRUST* cannot be estimated by the fixed effects model and thus the random effects model is used in this paper to estimate the effects of *TRUST*.

Table 1 displays the summary statistics and definitions of the variables used in the empirical analysis. As explained, the data set concerns 24 countries over 24 years, and so the results for each variable show considerable variation. Although OECD countries are considered to be developed, the maximum value of *INCOM* (per capita income) is USD68.3 which is about 13 times larger than the minimum value USD5.4. As for *UNEMP* (unemployment rate), the maximum value of 19.5 is also about 13 times larger than the minimum value of 1.5.

The coefficient of *TRUST* is predicted to be positive because, as argued earlier, social trust plays a role in improving the circumstances for parents raising a child. *INCOM* and *UNEMP* are included to capture economic factors. *INCOM* is expected to negatively impact fertility rates. This is because higher income levels increase the opportunity cost of giving birth. We expect *UNEMP* and *GINI* to have negative coefficients, because higher unemployment rates and *GINI* values increase the crime rate and so make circumstances less suitable for childcare. *FLAB* (female labor participation) and *DIV* (divorce rate) are thought to be associated with fertility (Sleebos, 2003). Higher female labor participation reduces time available for childcare, and hence, also reduces the incentive to have a child. Divorce destroys stable partnerships between male and female, and therefore, reduces fertility rate[11]. Children constitute marital capital (Becker et al., 1977). One argument is that couples produce more goods valuable inside their

[11] It should be noted that at the end of the 1990s births occurring outside marriages appeared to increase, and that female employment rates are positively associated with fertility (Sleebos, 2003).

relationship than outside the relationship. Divorce or separation can reduce the value of marriage and decrease the probability of having children, implying lower fertility rates[12].

IV. EMPIRICAL RESULTS

Table 2 displays our estimation results. The random effects estimation is valid when the null hypothesis is such that the two estimates, the fixed effects model and the random effects model, do not differ systematically (Baltagi, 2005). If the null hypothesis is not rejected, then the random effects model is preferred. Before discussing the results, we conduct a Hausman test (1978). In columns (1) and (2), the *p*-values are 0.95 and 0.56, suggesting that the null hypothesis should not be rejected. There are no differences between FE and RE. Hence, the random effects estimations are preferred.

There is a potential reverse causality between *FLAB* and fertility rates. That is, the presence of small children may increase the amount of work at home, which may reduce the desire of the mother to search for a job. On the other hand, the presence of small children increases the needs for additional income, which may increase the necessity of women seeking for employment. With respect to the relationship between *DIV* and fertility rates, there is also a possible reverse causality. If a couple has a small child of school age, divorce is less likely to occur because divorce seems to have a negative effect on childcare. These factors could lead to endogeneity bias and so we cancel the effects of *FLAB* and *DIV* in the specification shown in column (2)[13].

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[12] There are also several studies that examine the impact of unilateral and non-fault divorce laws on the fertility rate (Drewianka, 2006; Alesina and Giuliano, 2006; Stevenson, 2007).

[13] It should be noted that omitted-variable bias occurs in column (2) of Table 2. Hence,

We begin our discussion with the results of Table 2. The coefficient of *TRUST* is positive as anticipated, and is statistically significance in columns (1) and (2). Further, the absolute values of the coefficient are 0.01 in both columns. This means that a 1% increase in the rate of trust results in a 0.01 point increase in the fertility rate. Concerning the control variables, with the exception of *DIV* in column (1), the coefficients all have the predicted signs. However, the negative coefficient of *INCOM* is statistically significant in column (2) but not in column (1). The absolute value in column (1) is 0.15, while that in column (2) is 0.57. There is a large difference in the absolute value of the *INCOM* coefficient between columns (1) and (2). Hence the impact of *INCOM* is thought to be unstable according in our specifications. *UNEMP* has a negative coefficient, and this is statistically significant at the 1% level in both columns (1) and (2). The absolute values of this coefficient are 0.01 in both columns. This result indicates that a 1% increase in the unemployment rate reduces the fertility rate by 0.01 points. The negative coefficient of *GINI* is statistically significant in column (1) but not in column (2), and its absolute values are 0.52 and 0.93 in columns (1) and (2), respectively. This suggests that income inequality leads to a decrease in fertility rates, although the results for *GINI* are unstable for our specifications. Considering the results of *UNEMP* and *GINI* together tells us that insecure conditions caused by unemployment and income inequality reduce the parents' incentive to have a child. With respect to *FLAB*, the coefficient is negative as expected and is statistically significant at the 1% level. The absolute value of this coefficient is 0.02, meaning that a 1% increase in female labor participation reduces the fertility rate by 0.02 points.

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instead of dropping *FLAB* and *DIV*, an instrumental variables approach to account for the endogeneity bias should be conducted for more precise estimation. However, good instruments cannot be easily found and are beyond the scope of this paper.

In summary, we argue that the fertility rate in OECD countries depends not only on economic conditions but also on social trust. The extent to which the childcare and education markets function effectively, seems to be important when parents make a decision on having a child. Social trust is thought to underlie a well-functioning childcare and education market, and so plays a critical role in increasing fertility rates.

V. CONCLUSIONS

The fact that fertility rates have declined in developed countries has been widely observed. A number of researchers have explored why fertility decreases as per capita income rises. Furthermore, social trust has been given much attention by researchers in various social sciences. For instance, the relationship between social trust and economic growth and its modes of transmission have both been investigated (Zak and Knack, 2001; Bjørnskov, 2011). However, little is known about how social trust increases the labor force, and subsequently economic growth.

The purpose of this paper is thus to examine how social trust affects fertility rates by using panel data for 24 OECD countries. The major finding through random effects estimation is that social trust increases the fertility rate. A 1% increase in the trust rate leads to an increase of fertility by 0.01 points. We interpret this as implying that trust underlies desirable circumstances for bringing up a child in developed countries.

The empirical evidence presented here is based on data from 24 OECD countries. To more closely examine our results, it would be advantageous to use individual-level data. Furthermore, the endogeneity bias of female labor participation and divorce are not considered here, and should be controlled for by using an instrumental variables

approach. Finally, we assume that principal–agent problem is alleviated by social trust. Nevertheless, this assumption is not tested in this paper. These are issues remaining to be addressed in future research.

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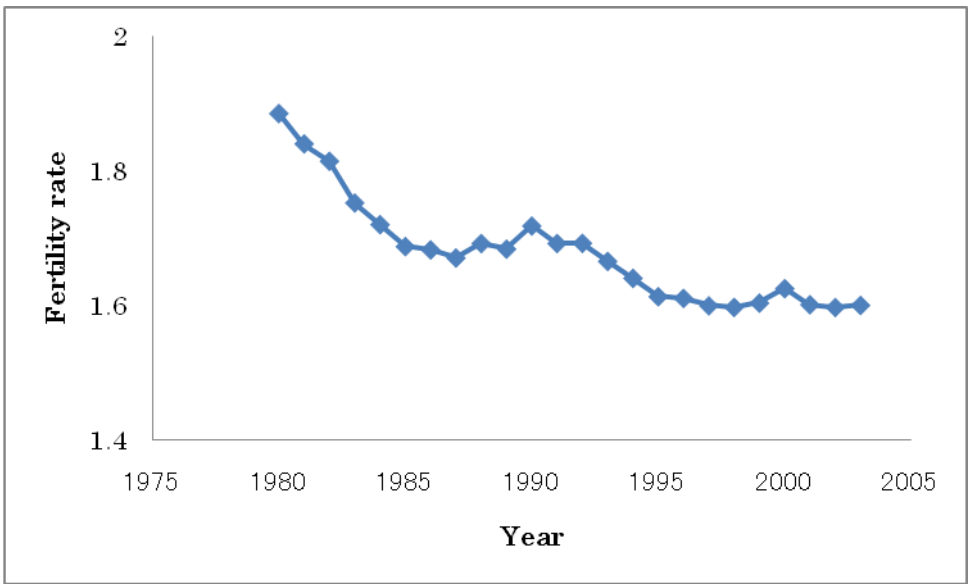

Figure 1. Changes in average fertility rates

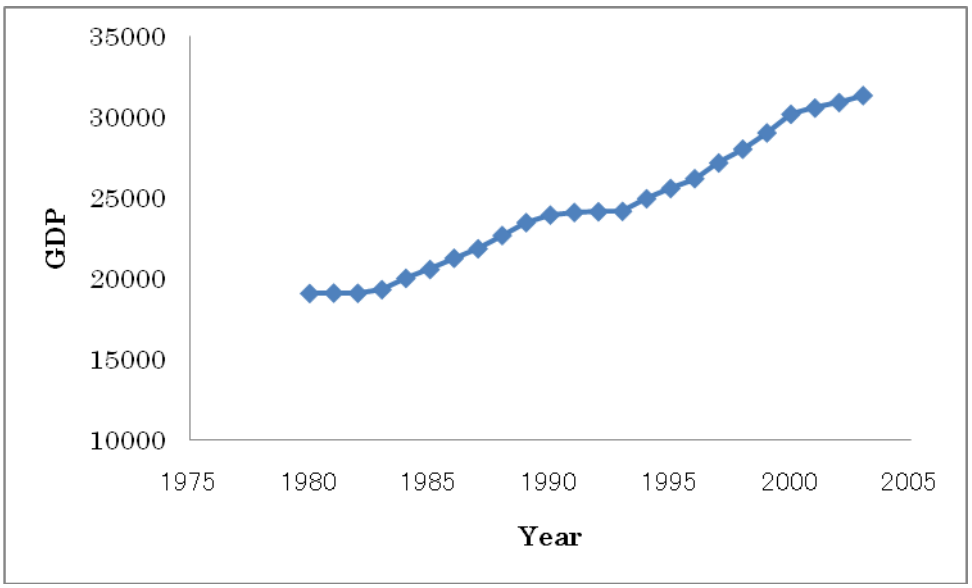

Figure 2. Changes in averge per capita GDP

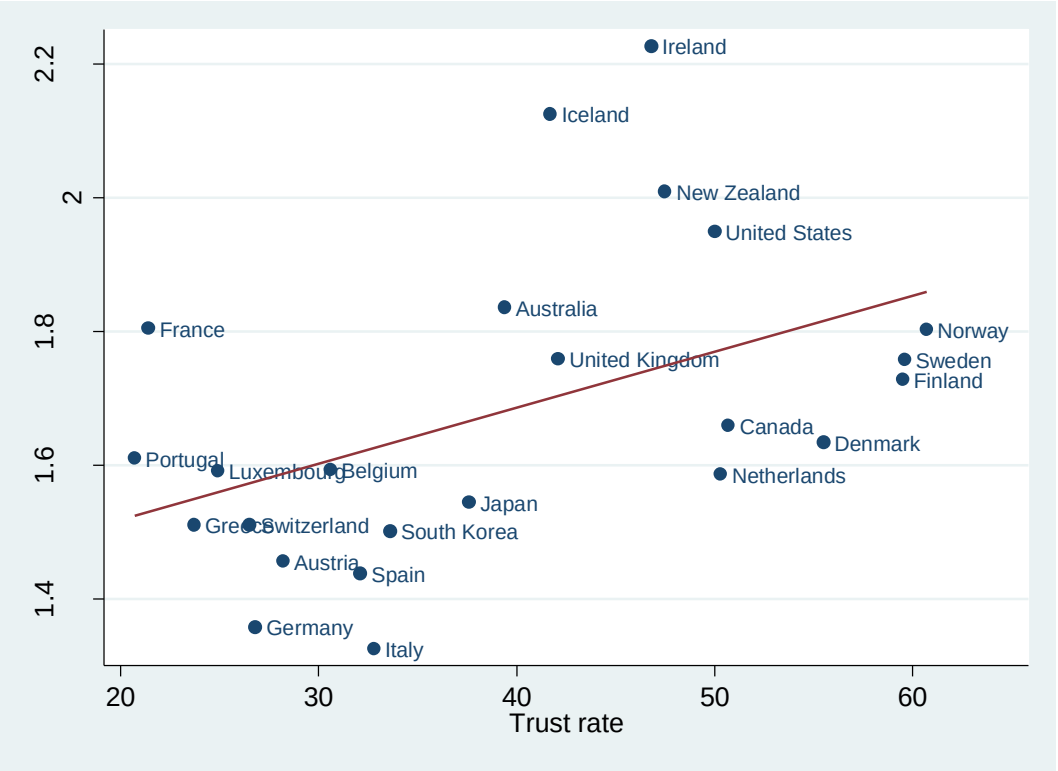

Figure 3. Correlations between averate fertility rate and trust rate

Table 1
Variable definitions, means, and standard deviations

Variables	Definition	Mean	Standard Deviation	Max	Min
FERTIL	Total fertility rate	1.67	0.28	3.22	1.15
TRUST	Rate of those who generally trust others (%)	39.2	12.6	60.7	20.7
INCOM	Per capita income. 1000 US$	24.7	80.7	68.3	5.4
UNEMP	Unemployment rate (%)	7.14	3.50	19.5	1.5
GINI	Gini coefficient	0.28	0.04	0.37	0.19
FLAB	Female labor participation rate (%)	41.6	4.2	48.0	27.9
DIV	Divorce rate (%)	2.1	0.9	5.2	0.2

Table 2
Determinants of fertility (random effects model).
Dependent variable: Total fertility rate

	(1)	(2)
TRUST	0.01***	0.01**
	(4.27)	(2.53)
INCOM	-0.15	-0.57***
	(-1.42)	(-4.88)
UNEMP	-0.01***	-0.01***
	(-3.40)	(-3.06)
GINI	-0.52**	-0.93
	(-2.50)	(-1.22)
FLAB	-0.02***	
	(-3.67)	
DIV	0.001	
	(0.04)	
Constant	3.81***	7.28***
	(3.62)	(6.18)
Observations	453	472
Hausman test	16.6	24.2
	p-value=0.95	p-value=0.56

Note: Numbers in parentheses are z-statistics. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively (one-sided tests). In all regression models, year dummy variables are included but are not reported to save space.

APPENDIX.

Table A1. OECD countries included in the regression analysis

Australia	Greece	Norway
Austria	Iceland	Portugal
Belgium	Ireland	South Korea
Canada	Italy	Spain
Denmark	Japan	Sweden
Finland	Luxembourg	Switzerland
France	Netherlands	United Kingdom
Germany	New Zealand	United States