

The Political Economy of Fertility

Thorsten Janus

University of Wyoming

Abstract

This paper studies the political economy of fertility. Specifically, I argue that fertility may be a strategic choice for ethnic groups engaged in redistributive conflict. I first present a simple conflict model where high fertility is optimal for each ethnic group if and only if the economy's ethnic diversity is high and/or institutions are weak. I then test the model in a cross-national dataset. Consistent with the theory, I find that economies with high ethnic diversity and/or weak institutions have higher fertility rates. I conclude that high fertility may have political roots.

Keywords: population; fertility; ethnic diversity; social conflict; social norms

JEL: D72, D74, J13, O12

1. Introduction

This paper studies the political economy of fertility. I particularly ask whether fertility may be a strategic choice for ethnic groups engaged in redistributive conflict.¹ There are at least two reasons why the answer could be affirmative. First, individuals in diverse societies tend to vote for co-ethnic political candidates, who then reward them with transfers, jobs, or local public goods (Young 1976, Bates 1981). Fertility should therefore increase an ethnic group's voting power and gains from political office. Second, if ethnic groups allocate society's resources via conflict or bargaining in the shadow of conflict (Horowitz 2000, Collier and Hoeffler 2004), then fertility might increase their combat strength.² Importantly, however, these redistributive gains to fertility should mainly be present where weak institutions erode the security of property rights.

To further explore these issues, this paper presents a simple model of redistributive ethnic conflict with endogenous fertility. I then test the model in a cross-national dataset. Consistent with the theory, I find that economies with high ethnic diversity and/or weak institutions have higher fertility rates. I conclude that high fertility may have political roots.

In the remainder of the paper, Section 2 reviews the politics of ethnic group size and fertility. Section 3 presents the model and Section 4 the empirical results. Section 5 considers the role of social norms in enforcing high fertility at the household level. Section 6 concludes.

¹ Bates (1981), Easterly and Levine (1997), Alesina et al. (2003), and Kimenyi and Romero (2008) study the economics of redistributive ethnic conflict. On ethnic diversity, politics and violence see Young (1976), Horowitz (2000), and Chandra (2007).

²Another incentive for population growth may be that larger groups can more easily impose their language or culture on the rest of society (Horowitz 2000).

2. The Politics of Ethnic Group Size and Fertility

Substantial evidence supports that the size and growth rates of ethnic groups in diverse societies play a political role. Udjo (1984), Kokole (1994), and Obono (2003), for example, explain the common perception in many African countries that the relative size of ethnic groups determines their political clout, and that fertility therefore is politicized. In Apartheid South Africa, the white minority regime tried to control fertility among blacks (Klausen 2002, Posel 2005). In 1982 and 1987 the Federal Assembly of Yugoslavia and the Macedonian parliament, respectively, passed resolutions to limit the growth of local Albanian populations, which were considered a threat by other ethnic groups (Brunnbauer 2004). In the Middle East, several governments have tried to increase the national population to promote security and decrease dependence on imported labor. Iraq promoted fertility after the onset of the Iran-Iraq war and fertility is a sensitive topic among Palestinians in Jordan due to the Arab-Israeli conflict (Faour 1989, Winckler 2005 Chapter 4). Attane and Courbage (2000) argue that minorities in China use fertility to affirm their group identity. Franks (1996) and Shiffman and del Valle (2006) explain how the East Timorese and indigenous peoples in Guatemala mistrust government health clinics because their ethnic groups were persecuted in the past. For example, there were rumors in East Timor that the Indonesian government sterilized women to control fertility. Shiffman et al. (2002) and Birenbaum-Carmeli (2009) study nationalistic government fertility promotion in Croatia, Serbia, and Israel, and Albanese (2004) links the rise of nationalist regimes in 20th century Germany, Italy, Russia, and Yugoslavia/Croatia to declining women's reproductive rights. Rubinstein and Lane (2003) discuss how populations are manipulated in ethnic conflicts via mass killings, expulsion, rape, and sterilization.

3. A model of Fertility and Ethnic Conflict

The model assumes two periods and $N \geq 2$ symmetric ethnic groups. In the first period each group $i = 1, \dots, N$ maximizes its lifetime payoff per capita by choosing population size n_i (equal to the labor force) and capital per worker k_i . Choosing the capital stock involves the usual trade-off between investment cost and future production increase. Choosing fertility involves a quality-quantity trade-off (Becker 1960): on one hand, population growth decreases the future capital stock per worker. On the other hand, the groups use a labor-intensive technology to appropriate society's output. Each group has first-period population size, capital stock, and income equal to unity, and a discount factor $\beta \in (0,1)$. In the second period, group i produces k_i^α , $\alpha \in (0,1)$, per capita.

However, group i 's second period *consumption* per capita is $\frac{1}{n_i} \frac{n_i^\eta}{\sum_{i=1}^N n_i^\eta} \sum_{j=1}^N n_j k_j^\alpha$, where

$\sum_{j=1}^N n_j k_j^\alpha$ is economy-wide output, $n_i^\eta / \sum_{i=1}^N n_i^\eta$ is the output share that accrues to group i as a result of redistributive conflict, and $\eta > 0$ (Tullock 1980, Hirshleifer 1991). Since the marginal return to the population input to conflict increases with η , and presumably conflict returns are higher where property rights are weak, I refer to η as institutional weakness. I also refer to the number of groups, N , as ethnic diversity.³ Group i solves (where c_{i1} and c_{i2} denote first and second period consumption, respectively)

³ Perhaps the most common measure of ethnic diversity (which is also used in Section 4) is the Herfindahl index $1 - \sum_{i=1}^N s_i^2$, where N is the number of ethnic groups in society and s_i is the population share of group i . With this

measure ethnic diversity in the model is $1 - \sum_{i=1}^N (1/N)^2 = 1 - 1/N$, which increases with N .

$$\max_{k_i, n_i} U_i = c_{i1} + \beta c_{i2} = (1 - k_i n_i) + \beta \frac{n_i^\eta}{\sum_{j=1}^N n_j^\eta} \frac{1}{n_i} \sum_{j=1}^N n_j k_j^\alpha \quad (1)$$

subject to

$$k_i n_i \leq 1, \quad (2)$$

$$k_i \geq \underline{k} > 0, \quad (3)$$

$$n_i \geq \underline{n} > 0. \quad (4)$$

(2) ensures feasibility and (3) and (4) bound the future capital stock and population from below.

(3) is plausible if part of the initial capital stock cannot be “eaten”. (4) is plausible if today’s agents can ensure their own or their descendants’ survival regardless of what is optimal for the group. I further avoid the less interesting corner solutions where the feasibility constraint (2) is

binding by assuming (A1) $\underline{n} \geq 0.5$ and (A2): $\underline{k} \leq \left(\frac{N}{(N-1)\beta(\eta-1)} \right)^{1/\alpha}$. To ensure a unique

solution I also assume $\alpha \neq (N-1)(\eta-1)$.

Proposition 1 *In the symmetric equilibrium*

(i) *If $\alpha > (N-1)(\eta-1)$ then $n = \underline{n}$ and $k = \max\{\underline{k}, (\beta\alpha / N\underline{n})^{1/(1-\alpha)}\}$.*

(ii) *If $\alpha < (N-1)(\eta-1)$ then $k = \underline{k}$ and $n = \max\left\{\underline{n}, \frac{\beta(N-1)(\eta-1)}{N\underline{k}^{1-\alpha}}\right\}$*

(iii) *Ethnic diversity and weak institutions tend to increase fertility.*

Proof In the appendix.

The intuition for Proposition 1 can be seen from the first-order conditions for investment and population growth (a6)-(a7) in the appendix:

$$\beta\alpha k^{\alpha-1} / N + \lambda_k = n \quad (6)$$

$$k = \beta(\eta-1) \frac{N-1}{N} \frac{k^\alpha}{n} + \lambda_n \quad (7)$$

(6) equates the marginal investment return with the marginal cost. Since group i only receives a share $1/N < 1$ of the social investment return, investment is inefficiently low. On the right hand side, a rise in (one plus) fertility n increases the marginal cost of equipping future group members with capital. (7) similarly equates the marginal cost of fertility, which is the cost of equipping future members with capital, with the net marginal benefit. The net marginal benefit is partly the discounted value of greater ability to appropriate society's output. One can show that this benefit equals (see the appendix) $\beta\eta \frac{(N-1)k^\alpha}{Nn}$. On the other hand, population growth dilutes income per capita, which leads to a loss $\beta \frac{1}{N} \frac{(N-1)k^\alpha}{n}$. Subtracting this from the previous expression gives the right hand side of (7).

From (6) and (7) the returns to capital and fertility when no constraints are binding ($\lambda_k = \lambda_n = 0$) are $MB_k / MC_k = \beta\alpha k^{\alpha-1} / Nn$ and $MB_n / MC_n = \beta(N-1)(\eta-1)k^{\alpha-1} / Nn$.

Therefore, the return to capital (production) exceeds the return to fertility (appropriation) for all values of k and n if and only if $\alpha > (N-1)(\eta-1)$. When this is true all ethnic groups prefer low fertility and high investment. On the other hand, when $\alpha < (N-1)(\eta-1)$ they prefer low investment and high fertility. A rise in ethnic diversity, N , or the weakness of property rights, η , makes the necessary and sufficient conditions for high fertility $\alpha < (N-1)(\eta-1)$ and $\frac{\beta(N-1)(\eta-1)}{Nk^{1-\alpha}} > \underline{n}$ more likely to hold. Further, fertility within the high-fertility equilibrium, $n = \frac{\beta(N-1)(\eta-1)}{Nk^{1-\alpha}}$, will rise.

4. Evidence Linking Fertility to Ethnic Diversity and Institutions

Unfortunately it is difficult to find time-varying data on ethnic diversity. I therefore estimate the relationship between diversity, fertility and institutions in a cross-section of countries. As the dependent variable I use a country's average net fertility rate between 2002 and 2007 computed from the World Bank's World Development Indicators (WDI).⁴ On the right hand side, the ethnic diversity data comes from Alesina et al. (2003) and defines diversity for country j as the

Herfindahl index $D_j = 1 - \sum_{i=1}^{N_j} s_{ij}^2$; where N_j is the number of distinct ethnic groups according to racial and linguistic criteria and s_{ij} is the population share of group i .⁵ Thus, with a single ethnic

⁴The net fertility rate is the total fertility rate – the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with prevailing age-specific fertility rates - times one minus the under-age 5 mortality rate.

⁵ For further discussion of the ethnic diversity data see Alesina et al. (2003).

group $D_j = 0$ and with many small groups $D_j \rightarrow 1$. I define *institutional weakness* $IW_j = 8 - executive\ constraints_j$, where *executive constraints*_{*j*} is country's *j*'s executive constraints score in the Polity IV dataset. This score ranges from 1 to 7 and I assume that less constrained executives are associated with weaker property rights and overall institutions (Acemoglu et al. 2001). Thus a higher *IW* score implies more institutional weakness. The model predicts a high fertility rate if and only if the product of ethnic diversity and institutional weakness exceeds a threshold ($(N-1)(\eta-1) > \alpha$), I therefore construct a dummy to equal one if $D_j * IW_j$ exceeds the sample mean (about 1.7) and zero otherwise.

. Regarding control variables, there is unfortunately no consensus among either demographers or economists concerning the determinants of fertility (Coale and Watkins 1986, Cleland and Wilson 1987, Hirschman 1994).⁶ Moreover, a number of the candidate determinants may be endogenous to fertility. As data limitations prevent me from addressing these issues completely, I gradually introduce lagged potential determinants sorted by their risk of being endogenous.⁷ I first include the rural population share from FAOStat since the demand for household labor may be greater in rural areas. Next, I control for the percentage of the population with access to an improved water source (from WDI): infrastructure may be either a substitute or

⁶ Barro (1991) finds a negative cross-country relationship between income and the net fertility rate. Barro and Lee (1993) find an inverted u-shaped cross-country relationship between income and total fertility after controlling for infant mortality. Ahituv (2001) finds a negative relationship between total fertility and human and physical capital in a country panel. Eckstein et al. (1999) and Herzer et al. (2010) find a negative long-run relationship between income and net fertility in time-series and panel data, respectively. Substantial evidence that fertility declines diffuse across countries (NRC Committee on Population 2010) may complicate estimation of fertility's determinants.

⁷ I am very grateful to a referee for suggesting this approach.

a complement to children.⁸ Third, I include GNI per capita in thousands of 2005 US PPP dollars from WDI. Including this income measure should help to control for parents' opportunity cost of time and income effects on fertility (Becker 1960, Rosenzweig and Stark 1997, Schultz 1997). Using PPP corrected data allows a better measure of living standards and therefore more precisely measured income- and opportunity cost effects, compared to uncorrected income measures. Fourth, I add the gross secondary enrollment rate for females from World Bank GenderStats:⁹ education in general and female education in particular are believed to decrease fertility by changing individuals' knowledge, preferences, opportunity costs or bargaining power in households (World Bank 2007). I further include region dummies in all regressions (with Western developed countries as the omitted region). Including region dummies may be important since sub-Saharan Africa, for example, has historically high ethnic diversity as well as fertility rates (Caldwell and Caldwell 1987). Finally, the institutional weakness measure *IW* should capture any direct effect of institutions on fertility, that is, effects other than via ethnic diversity. For example, institutions could affect household returns to fertility via goods, labor or financial markets (e.g. access to marketed consumption goods might decrease reliance on home production or formal insurance markets could limit the need for family networks).

⁸ If parents use children to collect water from faraway, for instance, improved water access should be a substitute.

⁹ The gross secondary enrollment rate for females is the ratio of the number of females enrolled in secondary school to the population of females of official secondary school age. Unlike net enrollment, gross enrollment includes females who attend secondary school outside the official age range. The net and gross rates for female secondary enrollment are highly correlated (>0.95), but using the gross rate enlarges the sample substantially. Ahituv (2001) finds that current enrollment (the flow of education) predicts fertility better than a country's average education level (the stock) and conjectures that the reason is large measurement errors for education levels.

Apart from ethnic diversity, all right hand side variables are measured in 2000 to maximize data availability. The model is estimated with OLS and robust standard errors. Although I cannot rule out that fertility might affect the right hand side variables, there are two reasons why fertility's effect on ethnic diversity in particular may be limited. First, the ethnic diversity measure from Alesina et al. (2003) is based on racial and linguistic characteristics, both of which are primarily determined by history and costly for individuals to change. Second, the latest ethnic diversity observation is from 2001, whereas fertility is averaged over 2002-2007. However, it is more difficult to rule out that expectations of future fertility could affect institutions or some of the control variables. Moreover, similar to other cross-country regressions the results may be affected by measurement errors, omitted variables, and moderate multicollinearity in the data. Thus, the results might be best interpreted with caution. Table 1 shows the summary statistics.

Table 1: Summary Statistics

Variable	Observations	Mean	S.d.	Min	Max
Net Fertility	182	2.76	1.22	1.15	5.94
Ethnic Diversity	183	0.44	0.26	0	0.93
GNI/Cap (PPP)	171	9,808	11,621	237	52,670
Inst Wkns (IW)	146	3.28	2.10	1	7
Rural Pop Share	197	0.46	0.24	0	0.92
F Sec Enrollment	139	0.69	0.36	0.05	1.70
Improved Water	176	0.82	0.19	0.21	1

Notes: Ethnic diversity is from Alesina et al. (2003). Net fertility along with GNI per capita (in \$US 2005 PPP) and the share of the population with access to an improved water source are from World Development Indicators (WDI) and author's calculations. IW is 8 minus a country's executive constraints score in the Polity IV dataset. The rural population share is from FAOStat and the gross female secondary enrollment rate from World Bank GenderStats.

Results

The results in Table 2 are consistent with high values of ethnic diversity and/or weak institutions leading to higher fertility. Thus, the signs on ethnic diversity and institutional weakness are positive and significant before the dummy denoting a high interaction between the two is included. Once included, the high interaction-dummy is positive and significant. The coefficients in Models 3-8 imply that countries where the product of ethnic diversity and institutional weakness exceeds the sample mean have 0.37-0.61 more surviving children per woman alive until the end of her childbearing years. (This amounts to additional 0.13-0.22 standard deviations). The findings for the control variables are consistent with expectations although not always significant: large rural populations, poor infrastructure (improved water access), and less female secondary enrollment are positively related to fertility. Unreported regressions show a stronger negative association between fertility and income before controlling for the rural population share, improved water access, and female schooling. All of these may be channels linking income to fertility at the country level. Institutional weakness has no significant direct effect but could potentially affect fertility via the other controls.

Robustness Checks

Table 3 shows several robustness checks. All regressions include a constant term, region fixed effects, and controls for the rural population share, access to an improved water source, income, and female secondary enrollment. For brevity these results are not reported. First, Model 8 interacts ethnic diversity with a dummy for weak institutions. This dummy equals zero when institutional weakness is low ($IW=1$) and one otherwise ($IW=2-7$). As expected the interaction

term is positive.¹⁰ A rise from the sample minimum to the maximum ethnic diversity level (0 to 0.93) is associated with a fertility increase of 0.9 children where institutions are weak. One standard deviation rise in diversity (0.26) is associated with an additional 0.23 children. Second, political autocracy should ease appropriation compared to democracy, since individual rights and liberties are less protected. Model 9 therefore interacts ethnic diversity with a country's democracy score from Polity IV. Since this score ranges from -10 (full autocracy) to 10 (full democracy), the model suggests a negative interaction effect of diversity and democracy. This is supported by the data. Third, higher appropriation returns and more intense redistributive conflict may be linked to more unstable political systems (although the model in the previous section is static). Model 10 therefore interacts diversity with political instability measured by the standard deviation of a country's democracy score before 2001. As expected this interaction term is positive. Fourth, Model 11 interacts diversity with income per capita since the empirical literature suggests that redistributive ethnic conflict is more intense in poorer countries (Horowitz 2000, Collier and Hoeffler 2004). As expected this interaction term is negative.

¹⁰ Including *IW* scores of 1-2 in the weak institutions group yields similar results. Including scores of 1-3 or 1-4 makes the interaction term insignificant. However, the coefficient on ethnic diversity is just over 0.5 and significant.

Table 2: Fertility and Ethnic Diversity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ethnic Diversity	0.681*	0.652*	0.275	0.467	0.296	0.127	0.247
	(0.269)	(0.253)	(0.322)	(0.302)	(0.272)	(0.263)	(0.284)
IW		0.112**	0.059	0.048	0.006	0.001	-0.005
		(0.042)	(0.047)	(0.043)	(0.037)	(0.035)	(0.040)
I(Div*IW>Mean)			0.438+	0.435*	0.369*	0.609**	0.529**
			(0.249)	(0.212)	(0.183)	(0.168)	(0.197)
Rural Pop Share				1.663**	0.719+	0.655	0.493
				(0.397)	(0.414)	(0.474)	(0.541)
Improved Water					-2.537**	-2.030**	-1.543*
					(0.508)	(0.508)	(0.618)
GNI/Cap						-0.012	-0.010
						(0.009)	(0.010)
F Sec Enr							-0.644
							(0.393)
E Europe	-0.160	-0.324*	-0.277*	-0.587**	-0.456**	-0.702**	-0.794**
	(0.121)	(0.129)	(0.126)	(0.148)	(0.139)	(0.224)	(0.282)
Lat Am	0.629**	0.588**	0.700**	0.478**	0.354*	0.250	-0.0251
	(0.146)	(0.168)	(0.176)	(0.164)	(0.155)	(0.252)	(0.306)
Asia	0.960**	0.488*	0.552*	-0.137	-0.234	-0.389	-0.691+
	(0.207)	(0.224)	(0.228)	(0.262)	(0.242)	(0.251)	(0.362)
Sub-Sah Africa	2.218**	1.871**	1.860**	1.161**	0.919**	0.689*	0.435
	(0.194)	(0.264)	(0.256)	(0.309)	(0.259)	(0.314)	(0.414)
N Afr & M East	0.797**	0.402+	0.419+	0.368	0.403+	0.128	-0.0502
	(0.171)	(0.231)	(0.233)	(0.239)	(0.223)	(0.267)	(0.345)
Constant	1.516**	1.395**	1.535**	1.085**	3.918**	3.818**	4.067**
	(0.0849)	(0.0971)	(0.116)	(0.171)	(0.607)	(0.690)	(0.830)
Observations	164	142	142	142	130	122	93
R-squared	0.69	0.72	0.73	0.78	0.84	0.86	0.87

Notes: Robust standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1. For definitions and sources, see the

notes to Table 1.

Table 3: Robustness Checks

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Ethnic Diversity	-0.033 (0.438)	0.837** (0.297)	0.050 (0.380)	0.978* (0.384)	0.249 (0.285)	0.258 (0.290)	0.522+ (0.264)
I(IW>1)	-0.126 (0.221)						
Diversity*I(IW>1)	0.958+ (0.504)						
Democracy		0.015 (0.018)					
Diversity*Democracy		-0.065+ (0.033)					
Political Instability			-0.086* (0.039)				
Diversity*Pol. Instability			0.219* (0.083)				
Diversity*GNI/Cap				-0.046* (0.022)			
IW					-0.026 (0.037)	0.006 (0.040)	-0.008 (0.052)
I(Div*IW>Mean)					0.632** (0.168)	0.488* (0.191)	0.602** (0.204)
Prim Compl Rate					-0.009+ (0.005)		
Internet						0.020* (0.008)	
Military Exp							0.012 (0.010)
Observations	93	93	98	104	89	93	82
R-squared	0.87	0.87	0.87	0.83	0.88	0.88	0.88

Notes: Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%.

Democracy is from Polity IV and ranges from -10 (full autocracy) to 10 (full democracy). Instability is the standard deviation of a country's democracy score before 2001. The primary completion rate, internet use, and the military expenditure-to-GDP ratio are from WDI. For other definitions and sources, see the notes below Table 1. All regressions include a constant term, region fixed effects, and controls for the rural population share, the percentage of the population with access to an improved water source, GNI per capita, and female secondary enrollment.

Finally, the last three models in Table 3 include alternative control variables: the primary completion rate instead of the female secondary enrollment rate (the two are highly correlated); internet use per thousand citizens to capture access to information; and the ratio of military expenditures to GDP in case nationalistic governments promote fertility (Courbage 1999,

Shiffman et al. 2002, Birenbaum-Carmeli 2009). The dummy for high interactions of ethnic diversity and institutional weakness remains positive and significant in all cases.¹¹

5. How Are Group and Household Fertility Incentives Aligned?

Section 3 assumed that each ethnic group chooses an optimal fertility rate. In practice, however, fertility is chosen by households. Therefore, if individual households bear more of the costs than the benefits of fertility – for example, they pay the childrearing cost but share the political gains with other households – there may be a free-riding problem. Although analyzing this problem in depth is beyond the scope of the paper, one solution may be fertility-related social norms

¹¹ The following changes also do not affect the qualitative results: using the percentage of GDP produced in agriculture (from WDI) instead of the rural population share, or electricity or energy consumption per capita (WDI) instead of access to an improved water source; including the female-male ratio in primary or secondary enrollment, the female labor force participation rate, or the percentage of parliamentary seats held by women (GenderStats) to capture gender equality (Pande 2003, Iyigun and Walsh 2007); including the under-age 5 mortality rate (WDI), the percentage of females in the population, life expectancy, or female life expectancy (GenderStats). Including the percentage of roads that are paved instead of access to an improved water source makes the interaction between diversity and institutional weakness insignificant. However, the coefficient on ethnic diversity is 0.56 with $p=0.102$, the paved roads variable is not significant, and the sample size drops to 69. The results are similar to the ones in Table 2 using 1999 or 2001 data after dropping access to an improved water source (for which only 2000 data exists). Data for earlier years is prohibitively scarce. In principle group conflict could be organized along religious rather than ethnic lines (McQuillan 2004). However, replacing the ethnic diversity measure with religious diversity from Alesina et al. (2003) yields insignificant results.

(Caldwell and Caldwell 1987, Dasgupta 1995, Watkins 1996, Kohler 2001).¹² Bardhan and Udry (1999, Chapter 3) and Munshi and Myaux (2006), for example, show that fear of social sanctions by neighbors may induce all households in a community to choose the same fertility rate. Manski and Mayshar (2003) also find multiple equilibriums in fertility by assuming a preference for social conformity.¹³

If such multiple equilibrium models are correct, then redistributive ethnic conflict might increase fertility by making households coordinate on high fertility outcomes. Consistent with this idea, leaders among Tibetans in exile in South Asia declared until recently that high fertility should be a group objective (Childs and Barkin 2008). As another coordination device, ethnic group members may observe the same fertility-promoting ideology. Thus, Manski and Mayshar (2003) find that in Israel in the past half-century parts of the ultra-Orthodox Jewish population have experienced rapid and substantial fertility increase compared to other ethnic-religious groups. Anson and Meir (1996) find that fertility rates across census areas in Israel are correlated with nationalist support.¹⁴ A recent but rapidly growing literature further suggests that fertility

¹² Important norms affecting fertility in sub-Saharan Africa may include that mothers rather than fathers bear the cost of children, kin groups rather than parents bear the cost, and fertility promotes social status (Udjo 1984, Caldwell and Caldwell 1987).

¹³ Another solution to free-riding problems may be that ethnic elites in political office design child support, education, health care, labor market, infrastructure or other policies to promote fertility.

¹⁴ See also Kanaaneh (2002) and Nahmias and Stecklov (2007) on Palestinians in Israel. Brown and Ferree (2005) find correlations between falling fertility, rising immigration and pronatalist appeals in major newspaper articles in Great Britain 2000-2. Kunovich and Deitelbaum (2004) find that Croatia's ethnic conflict experience after Yugoslavia's demise caused a resurgence of traditional values, where women were to serve as "mother of the nation."

norms can be transmitted across generations.¹⁵ As Bisin and Verdier (2010) explain, children's fertility preferences may be shaped by either their parents or the societies in which they grow up. In the former case, parents subject to high fertility norms may instill high fertility preferences in their children to avoid social ostracism. In the latter case, high fertility norms prevailing during childhood may be automatically transmitted to children. Once a generation of parents intrinsically values fertility, it may prefer its children to do the same (Bisin and Verdier 2010).

5. Conclusion

This paper has studied the link between political conflict and national fertility rates. I find that a simple theoretical model and a cross-national dataset support that fertility rates are higher where ethnic diversity is high and/or institutions are weak. I further argue that ethnic groups may enforce high fertility among their constituent households via social norms. Thus, the causes of high fertility may be political as well as economic.

¹⁵ For empirical evidence see Alesina et al. (2011) and Fernandez and Fogli (2006, 2009).

References

- Acemoglu, Daron, Simon Johnson and James Robinson 2001. The Colonial Origins of Comparative Development: An Empirical Investigation. *American Economic Review* 91, 5, 1369-1401
- Ahituv, A., 2001. Be Fruitful or Multiply: On the interplay between Fertility and Economic Development, *Journal of Population Economics* 14, 1, 51-71.
- Albanese, Patrizia 2004. Abortion & Reproductive Rights under Nationalist Regimes in Twentieth Century Europe. *Women's Health and Urban Life* 3, 1, 8-33
- Alesina, A., A Devleeschauwer, W Easterly, S y. Kurlat and R Wacziarg 2003. Fractionalization. *Journal of Economic Growth* 8, 2, 155-94
- Alesina, Alberto, Paolo Giuliano and Nathan Nunn 2011. Fertility and The Plough. *American Economic Review Papers and Proceedings* 101, 2, forthcoming
- Anson, Jon and Avinoam Meir 1996. Religiosity, Nationalism and Fertility in Israel. *European Journal of Population* 12, 1, 1-25
- Attane, I., & Courbage, Y. (2000). Transitional Stages and Identity Boundaries: The case of Ethnic Minorities in China. *Population and Environment*, 21, 257–280.
- Bardhan, Pranab and Christopher Udry 1999. *Development Microeconomics*. New York: Oxford University Press.
- Barro Robert J 1991. Economic Growth in a Cross Section of Countries. *Quarterly Journal of Economics* 106, 2, 407-443
- Barro Robert J and Jae Woo Lee 1993. Losers and Winners in Economic Growth. NBER Working Paper No. 4341

- Bates, Robert H 1981. *Markets and States in Tropical Africa: The Political Basis of Agricultural Policies*. Berkeley: University of California Press.
- Becker, Gary S 1960. An Economic Analysis of Fertility. In: *Demographic and Economic Change in Developed Countries*. Princeton: National Bureau of Economic Research, 209-31.
- Birenbaum-Carmeli, Daphna 2009. The Politics of ‘The Natural Family’ in Israel: State Policy and Kinship Ideologies. *Social Science and Medicine* 69, 7, 1018-24
- Bisin, Alberto and Thierry Verdier 2010. The Economics of Cultural Transmission and Socialization. NBER Working Paper 16512
- Brown, Jessica Autumn and Myra Marx Ferree 2005. Close Your Eyes and Think of England. *Gender and Society* 19, 1, 5-24
- Brunnbauer, Ulf 2004. Fertility, Families and Ethnic Conflict: Macedonians and Albanians in the Republic of Macedonia, 1944-2002. *Nationalities Papers* 32, 3, 565-98
- Caldwell, John C. and Pat Caldwell 1987. The Cultural Context of High Fertility in sub-Saharan Africa. *Population and Development Review* 13, 3, 409-437
- Chandra, Kanchan 2007. *Why Ethnic Parties Succeed: Patronage and Ethnic Head Counts in India*. New York: Cambridge University Press
- Childs, Geoff and Gareth Barkin 2008. Reproducing Identity: Using Images to Promote Pronatalism and Sexual Endogamy among Tibetan Exiles in South Asia. *Visual Anthropology Review* 22, 2, 34-52
- Cleland, John and Chris Wilson 1987. Demand Theories of the Fertility Decline: An Iconoclastic View. *Population Studies* 41, 1, 5-30
- Coale, Ansley J and Susan Cotts Watkins (eds) 1986. *The Decline of Fertility in Europe*. Princeton: Princeton University Press

Collier, Paul and Ankle Hoeffler 2004. Greed and Grievance in Civil War. *Oxford Economic Papers* 56, 4, 563-95

Courbage, Yussef 1999. Economic and Political Issues of Fertility Transition in the Arab World—Answers and Open Questions. *Population and Environment* 20, 4, 353-80

Dasgupta, Partha 1995. The Population Problem: Theory and Evidence. *Journal of Economic Literature* 33, 4, 1879-1902.

Easterly, William and Ross Levine 1997. Africa's Growth Tragedy: Policies and Ethnic Divisions. *Quarterly Journal of Economics* 112, 4, 1203-50.

Easterly, William 2001. Can Institutions Resolve Ethnic Conflict? *Economic Development and Cultural Change* 49, 4, 687-706.

Eckstein, Z. Mira, P., and Wolpin, K., 1999, A Quantitative Analysis of Swedish Fertility Dynamics. *Review of Economic Dynamics* 2, 1, 137-165.

Faour, Muhammad 1989. Fertility Policy and Family Planning in the Arab Countries. *Studies in Family Planning* 20, 5, 254-63

Fernandez, R. and A. Fogli. 2006. The Role of Culture and Family Experience. *Journal of the European Economic Association* 4, 2-3, 552-561.

Fernandez, R. and A. Fogli. 2009. Culture: An Empirical Investigation of Beliefs, Work, and Fertility. *American Economic Journal: Macroeconomics* 1, 1, 146-177.

Franks, Emma 1996. Women and Resistance in East Timor: "The Centre, as They Say, Knows Itself by the Margins". *Women's Studies International Forum* 19, 1-2, 155-68

Herzer, Dierk, Holger Strulik and Sebastian Vollmer 2010. The Long-run Determinants of Fertility: One Century of Demographic Change 1900-1999. Harvard Initiative for Global Health, Program on the Global Demography of Aging Working Paper No. 63.

- Hirschman, Charles 1994. Why Fertility Changes. *Annual Review of Sociology* 20, 203-33
- Hirshleifer, Jack 1991. The Paradox of Power. *Economics and Politics* 3, 177-200
- Horowitz, Donald 2000. *Ethnic Groups in Conflict*. 2nd Ed. Berkeley: University of California Press.
- Iyigun, Murat and Randall P Walsh 2007. Endogenous Gender Power, Household Labor Supply and the Demographic Transition. *Journal of Development Economics* 82, 1, 138-55
- Kanaaneh, Rhoda Ann 2002. *Birthing the Nation: Strategies of Palestinian Women in Israel*. Berkeley: University of California Press
- Kimenyi, Mwangi S and Roxana Guterrez Romero. Identity, Grievances and Economic Determinants of Voting in the 2007 Kenyan Elections. University of Connecticut Department of Economics Working Paper No. 38.
- Klausen, Susanne 2002. *The Uncertain Future of White Supremacy and the Politics of Fertility in South Africa 1930-1939*. Presented at the University of Natal African Studies Seminar
- Kohler, Hans-Peter 2001. *Fertility and Social Interaction: An Economic Perspective*. Oxford: Oxford University Press
- Kokole, Omari H 1994. The Politics of Fertility in Africa. *Population and Development Review* 20, Supplement: The New Politics of Population: Conflict and Consensus in Family Planning, 73-88.
- Kunovich, Robert M and Catherine Deitelbaum 2004. Ethnic Conflict, Group Polarization and Gender Attitudes in Croatia. *Journal of Marriage and Family* 66, 5, 1089-1107
- Manski, Charles F and Joram Mayshar 2003. Private Incentives and Social Interactions: Fertility Puzzles in Israel. *Journal of the European Economic Association* 1, 1, 181-211

- McQuillan, Kevin 2004. When Does Religion Influence Fertility? *Population and Development Review* 30, 1, 25-56.
- Munshi, Kevin and Jacques Myaux (2006). Social Norms and the Fertility Transition. *Journal of Development Economics* 80, 1, 1-38
- Nahmias, Petra and Guy Stecklov 2007. The Dynamics of Fertility amongst Palestinians in Israel from 1980 to 2000. *European Journal of Population* 23, 1, 71-99
- National Research Council Committee on Population 2010: *The Role of Diffusion Processes in Fertility Change in Developing Countries: Report of a Workshop*. By Holly Reed, Rona Briere and John B. Casterline. Washington, DC: National Academy Press
- Obono, Oka 2003. Cultural Diversity and Population Policy in Nigeria. *Population and Development Review* 29, 1, 103-11
- Pande, Rohini 2003. Can Mandated Political Representation Provide Disadvantaged Minorities Policy Influence? Theory and Evidence from India. *American Economic Review* 93, 4, 1132-1151
- Posel, Deborah 2005. Sex, Death and the Fate of the Nation: Reflections on the Politicization of Sexuality in Post-Apartheid South Africa. *Africa* 75, 2, 125-53
- Rosenzweig, Mark R and Oded Stark 1997. *Handbook of Population and Family Economics* Volume 1A, 241-420. Amsterdam: Elsevier.
- Rubinstein, Robert A and Sandra D Lane 2003. Population, Identity and Political Violence. *Social Justice: Anthropology, Peace and Human Rights* 3, 3-4, 139-52
- Schultz T. Paul 1997. Demand for Children in Low Income Countries. In: *Handbook of Population and Family Economics* Volume 1A, 350-430. Amsterdam: Elsevier

- Shiffman, Jeremy and Ana Lucia Garces del Valle 2006. Political History and Disparities in Safe Motherhood between Guatemala and Honduras. *Population and Development Review* 32, 1, 53-80
- Shiffman, Jeremy, Marina Skrabalo and Jelena Subotic 2002. Reproductive Rights and the State in Serbia and Croatia. *Social Science & Medicine* 54, 4, 625-642
- Tullock, Gordon 1980. Efficient Rent-Seeking. In: JM Buchanan, RD Tollison and G Tullock (Eds) *Toward a Theory of the Rent-Seeking Society*. College Station, Texas A&M University Press, 97-12
- Udjo, Eric O 1984. Obstacles to Successful Fertility Control in Nigeria. *Social Science and Medicine* 19, 11, 1167-71
- Watkins, Susan Cotts 1996. Social Interactions and Contemporary Fertility Transitions. *Population and Development Review* 22, 4, 639-82
- Winckler, Onn 2005. *Arab Political Demography*. Volume 1: Population Growth and Natalist Policies. Sussex Academic Press
- World Bank 2007. Population Issues in the 21st Century: The Role of the World Bank. World Bank Health, Nutrition and Population Discussion Paper 40583.
- Young, Crawford 1976. *The Politics of Cultural Pluralism*. Madison: University of Wisconsin Press.

Appendix: Proof of Proposition 1

Denoting the multipliers for (2)-(4) in the main paper by $\lambda_{k_i n_i}$, λ_{k_i} and λ_{n_i} , group i 's Lagrange problem is

$$L = c_{i1} + \beta c_{i2} = (1 - k_i n_i) + \beta \frac{n_i^\eta}{\sum_{j=1}^N n_j^\eta} \frac{1}{n_i} \sum_{j=1}^N n_j k_j^\alpha + \lambda_{k_i n_i} (1 - k_i n_i) + \lambda_{k_i} k_i + \lambda_{n_i} (n_i - \underline{n}). \quad (\text{a1})$$

The first order conditions for k_i and n_i are

$$-n_i + \beta \frac{n_i^\eta}{\sum_{j=1}^N n_j^\eta} \alpha k_i^{\alpha-1} - n_i \lambda_{k_i n_i} + \lambda_{k_i} = 0 \quad (\text{a2})$$

$$-k_i + \beta \left(\frac{\eta n_i^{\eta-1} \left(\sum_{j \neq i}^N n_j^\eta \right)}{\left(\sum_{j=1}^N n_j^\eta \right)^2} \frac{1}{n_i} \sum_{j=1}^N n_j k_j^\alpha + \frac{n_i^\eta}{\sum_{j=1}^N n_j^\eta} \frac{-\sum_{i \neq j} n_j k_j^\alpha}{(n_i)^2} \right) - k_i \lambda_{k_i n_i} + \lambda_{n_i} = 0 \quad (\text{a3})$$

and the complementary slackness conditions. Using symmetry, dropping the group identifying subscript, and simplifying implies that in the symmetric equilibrium, where I assume and later verify that (2) is non-binding ($\lambda_{k_i n_i} = 0$),

$$\beta \alpha k^{\alpha-1} / N + \lambda_k = n \quad (\text{a4})$$

$$k = \beta \frac{N-1}{N} \frac{k^\alpha}{n} (\eta-1) + \lambda_n. \quad (\text{a5})$$

These can be written

$$\frac{\beta\alpha}{Nn} k^{\alpha-1} + \frac{\lambda_k}{n} = 1 \quad (\text{a6})$$

$$\frac{\beta(\eta-1)(N-1)}{Nn} k^{\alpha-1} + \frac{\lambda_n}{k} = 1 \quad (\text{a7})$$

The rest of the proof proceeds in four steps. Step 1 shows that either (3), (4) or both are binding. Step 2 shows that $\alpha > (N-1)(\eta-1)$ implies part (i) of the proposition. Step 3 shows that $\alpha < (N-1)(\eta-1)$ implies part (ii). Step 4 shows that part (iii) follows from (i) and (ii).

Step 1. Suppose that neither (3) nor (4) bind ($\lambda_k = \lambda_n = 0$). Then (a6)-(a7) can only hold if $\alpha = (N-1)(\eta-1)$, but $\alpha \neq (N-1)(\eta-1)$. Thus either (3), (4), or both are binding.

Step 2. If $\alpha > (N-1)(\eta-1)$, then from comparing (a6)-(a7) either (a) $\lambda_n > \lambda_k = 0$ or (b) $\lambda_k, \lambda_n > 0$. In Case (a) we have $n = \underline{n}$ and from (a6) $k = (\beta\alpha / N\underline{n})^{1/(1-\alpha)}$. Condition (2) can be

ignored if $k\underline{n} = (\beta\alpha / N\underline{n})^{1/(1-\alpha)} \underline{n} = \left(\frac{\beta\alpha}{N\underline{n}^\alpha} \right)^{1/(1-\alpha)} \leq 1$ or $N\underline{n}^\alpha \geq \beta\alpha$, which is true by (A1) since

$N \geq 2$, $\underline{n} > 0.5$ and $\beta, \alpha < 1$. In case (b), again $n = \underline{n}$ and now also $k = \underline{k}$. This case applies if and only if, using (a6), $\frac{\beta\alpha}{N\underline{n}} \underline{k}^{\alpha-1} < 1$ or $\underline{k} > (\beta\alpha / N\underline{n})^{1/(1-\alpha)}$. This establishes part (i).

Step 3. If $\alpha < (N-1)(\eta-1)$, then from comparing (a6)-(a7) either (a) $\lambda_k > \lambda_n = 0$ or (b)

$\lambda_k, \lambda_n > 0$. In Case (a) we have $k = \underline{k}$ and from (a7) $n = \frac{\beta(N-1)(\eta-1)}{N\underline{k}^{1-\alpha}}$. Condition (2) can be

ignored if $n\underline{k} = \frac{N-1}{N} \frac{\beta(\eta-1)}{\underline{k}^{1-\alpha}} \underline{k} \leq 1$ or $\underline{k}^\alpha \leq \frac{N}{(N-1)\beta(\eta-1)}$, which is true by (A2). In Case (b)

again $k = \underline{k}$ and now also $n = \underline{n}$. This case applies if and only if, using (a7),

$\frac{\beta(\eta-1)(N-1)}{N\underline{n}} \underline{k}^{\alpha-1} < 1$ or $\underline{n} > \frac{\beta(N-1)(\eta-1)}{N\underline{k}^{1-\alpha}}$. This establishes part (ii).

Step 4. The only possible fertility rate above the minimum \underline{n} is $n = \frac{\beta(N-1)(\eta-1)}{N\underline{k}^{1-\alpha}}$. As shown in

parts (i) and (ii), this can only happen if $\alpha < (N-1)(\eta-1)$ and $\underline{n} < \frac{\beta(N-1)(\eta-1)}{N\underline{k}^{1-\alpha}}$. Both

conditions are more likely when ethnic diversity, N , or institutional weakness, η , is higher.

Moreover, conditional on these necessary conditions holding, $n = \frac{\beta(N-1)(\eta-1)}{N\underline{k}^{1-\alpha}}$, which is

increasing in N and η . \square