Section

1302 Poster Sessions

Educational Assortative Mating and Fertility in Brazil

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Abstract

This paper analyzes the influences of women and men's education in the observed fertility, and whether women with higher education than men have more influence in the number of children that the couple has. The data is from the National Household Survey on Health and Demography (PNDS) in Brazil in the year of 2006. The analysis used the diagonal mobility model. The results show that women's education influences fertility more than men's education and when women have higher education than men it increases women's influence. Controlling for a set of variables the results decrease around 10%. I intend to analyze data for 80's and 90's in order to create a comparison during a period of great educational expansion and women empowerment.

Key words: fertility, educational assortative mating, diagonal mobility model.

1. Introduction and Background

Women's education is known as being strongly associated with fertility level. However, little is studied about men's education and its relation to the couple's fertility. The inclusion of men's education in the studies are important because fertility is a result of two persons interaction, even if they do not discuss fertility directly, each partner's characteristics may influence each other's

decisions about reproduction; and men's education is not only associate to his income, but it is also a measure of social capital. Another relevant analysis is whether women with higher education have more influence in fertility. There has been a great investment in women's education in order to reduce fertility, and an expectation that lower education might lead to higher educational level for women. Therefore, it is relevant to analyze whether they have more decision power about fertility.

2. Methods

2.1 Data

The data is from a National Household Survey on Health and Demography (PNDS) in the year of 2006. This survey is part of the DHS project the focus was on women's and children's health and at the end 15.575 women aged between 15 and 49 and 5.000 children under 5 years old. Therefore, the information about men's education was answered by the women.

2.2 Statistical Approach

2.2.1 Study Group

The analyzed group is married or cohabiting couples, which the women are between 20 and 34 years old in Brazil during 2006. This age range intends to try to capture people who are in their first marriage, as used by Fu (2008) and Ribeiro (2008) and justified by Mare (1991) who indicates that the marriage pattern of the first and second marriage is different. It is a very strong assumption and it would be better to have data about marriage history, but this data is not available in the database. This restriction is also important for studying the relationship between fertility and marriage. Because in the database does not have information about parenthood for

each child and the number of ever born is answered by the women[1], the assumption is that the spouse at the time of the survey is the father of all children. The educational groups considered are: up to 7 years of education, basic education (8 years), some high school, complete high school, some college and more.

2.2.2 Diagonal Mobility Model

For analyzing the influence of men's and women's education in observed fertility, I used the Diagonal Reference Model formulated by Sobel (1981 1985). The diagonal reference model is appropriate to study partner effects in fertility decision process when the couple is the unit of analysis and an independent variable is asymmetric for women and men in a specific outcome (i.e.fertility). Originally the Diagonal Model was formulated for estimating the separate effect of father's occupation, individual's occupation, and the discrepancies between them (social mobility). Sorenson (1989) analyzed the effect of women's and men's education attainment in fertility in United States. Other applications are Sorenson and Brownfield (1991) analysis of mother's and father's characteristics on delinquency. Clifford and Heath (1993) tested the effect of social mobility on voting behavior. Van der Sirk et al (2002) work on the effects of both parents' educational levels on their child-rearing values conformity. And Vaisey's (2009) paper on poor/non poor aspirations and ideals effect on educational attainment.

The basic argument behind the model is that within educationally homogamous couples, the educational level of one's spouse cannot have an additional effect on one's own fertility. The model is characterized by i) the weights for men (1-p) and for women (p) are constrained to sum 1 and ii) the coefficients calculated for homogenous couples should also sum zero, and they are considered equal for both men and women. The model specification is (Sobel 1985):

[1] In 2002, the mean at divorce for men was 37.7 years old and for women 35, therefore unions within this age rage seems to be first marriage (Source: IBGE - http://www.ibge.gov.br/home/presidencia/noticias/noticia_visualiza.php?id_noticia=132&id_pagina=1).

$$Y_{ijk} = (p).(educ\_w_i) + (1-p).(educ\_m_j) + \sum \beta X_{ijk|} + e_{ijk}$$

where i= women's education

j=men's education

p=weight (0≤w≤1)

k=1 to 702545(total sample)

| = number of control variables

e= error term

The main advantages for using the Diagonal Reference Model are: 1) the weight parameter allows a clear one-parameter test of the relative strength of two matched categorical variables; 2) the estimation of single coefficients for each value of the matched variables makes these variables much more interpretable in the context of substantial collinearity between the matched variables (spouses' education might be correlated, and it makes hard to separate the effect of education on fertility) and 3) more parsimonious than conventional models, like the Poisson in which there are eight coefficients to be interpreted (Vaisey 2009).

2.2.3 Variables

- Dependent variable: number of children ever born per married or cohabiting couple, in which the women are between 20 and 34 years old.
- Independent Variable: Educational composition of marriage couples, considering each spouse's highest level of education.
- Control Variables:
    - Men's age: continuous variable.
    - Women's age: continuous variable.
    - Women's age at first birth
    - Household income

- Women's race: white/non white
- Women's religious: protestant, catholic, other, and no religious filiation
- Urban/Rural area: dummy variable, one equals urban and zero equals rural.
- Cohabiting: dummy variable, one equals to cohabiting couples

3. Descriptive Analysis

Table 1 presents the average of children ever born, the standard deviation and the sample size. Some groups have a very small sample, and it might be worth to aggregate some educational groups in order to have more robust results, especially because not all educational levels are significative in the Diagonal Model. Another thing that I'm doing is run the same model using Census data.

Analyzing the marginals we see that among the two lowest levels (up to 7 years and basic education) women have higher fertility than men, but then the relationship inverts. Another interesting point is that the average number of children seems to be more influenced by women's education, for example, if the men's education is some college or more and the women's is up to 7 years they have on average 1.8 children; if it is the opposite the average number of children is 1.59. In the first case 1.8 is closer to 2.28 (women with educational level up to 7 years) than to 1.49 (men with at least some college), and in the second case 1.59 is closer to 1.43 (women's) than to 2.17 (men's).

Comparing the number of children between the groups upper to the diagonal and below the diagonal we can see that higher levels of education for both men and women decrease fertility, and the influence seems to be stronger when women have higher education than men. The overall picture is similar using Census data for 2000.

TABLE 1 – Average of Children ever Born, Standard Deviation, and Sample Size by Women's and Men's Education

		Men's education					
		Up 7 years	Basic Educ	Some HS	HS	Some College +	Total
Women's education	Up 7 years	**2.37**	**2.18**	**2.17**	**1.88**	**1.80**	**2.28**
		(1.16)	(1.07)	(.82)	(1.06)	(.79)	(1.13)
		1340	189	69	153	12	1763
	Basic Educ	**2.01**	**1.82**	**1.99**	**1.65**	**1.62**	**1.87**
		(.87)	(.87)	(.91)	(.9)	(1.19)	(.89)
		250	128	31	97	8	514
	Some HS	**1.65**	**1.71**	**1.70**	**1.74**	**2.19**	**1.71**
		(.89)	(.76)	(.89)	(.78)	(1.13)	(.84)
		140	66	70	91	11	378
	HS	**1.77**	**1.53**	**1.48**	**1.51**	**1.46**	**1.57**
		(.9)	(.8)	(.6)	(.67)	(.62)	(.75)
		273	135	68	462	92	1030
	Some College +	**1.59**	**1.43**	**1.51**	**1.36**	**1.43**	**1.43**
		(.8)	(.67)	(.88)	(.52)	(.64)	(.64)
		28	20	16	80	114	258
	Total	**2.17**	**1.80**	**1.78**	**1.60**	**1.49**	**1.89**
		(1.1)	(.92)	(.84)	(.79)	(.68)	(.99)
		2031	538	254	883	237	3943

Source: PNDS 2006

4. Preliminary Results

Table 2 presents the results for the Diagonal Mobility Models. The first and the third model s have no control variable, the difference is the inclusion of a dummy variable whether women's education is higher than men's education in the weight. In models two and four all control variables were included. The first model shows that women's education corresponds to 67.6% and men's education 32.4%, in the second model we can see that the weight for when women's have a higher education than men is 31.6% (total women 80.1% and total men 19.9%), which means a much higher power of decision for women. Including control variables, women's education has 66% and men's education 34% men and considering women with higher education – 70.4% (women) about 10% less than without control.

Even controlling with fewer variables the results are quite similar using Census data for year 2000. Without control variables women's education influences fertility level in 68.69% and men's education 31.31%; considering women with higher education women's education has 75.65% and men'24.35%; the weight for higher female education is 18.42% (positive for women and negative for men) using urban/rural; married/cohabitation; and women's age as control variables the results are: 70.49% (women) and 29.51% (men) and considering higher education for women, the values are 77.25% (women) and 22.75% (men).

TABLE 2 – Diagonal Mobility Model Results

Variables	Model 1	Model 2	Model 3	Model 4
Up 7 years	0.651	0.635	0.239	0.242
	(0.046)	(0.048)	(0.041)	(0.049)
Basic Educ	0.060	0.072	-0.058	-0.060
	(0.063)	(0.064)	(0.05)	(0.079)
Some HS	-0.124	-0.068	-0.021	-0.008
	(0.062)	(0.063)	(0.055)	(0.082)
HS	-0.256	-0.261	-0.124	-0.108
	(0.042)	(0.04)	(0.031)	(0.03)
Some College +	-0.332	-0.378	-0.036	-0.066
	(0.064)	(0.058)	(0.053)	(0.058)
weight (women)	0.676	0.485	0.660	0.590
	(0.052)	(0.099)	(0.11)	(0.27)
w_higher		0.316		0.114
		0.140		(0.457)
weight (men)	0.324	0.515	0.340	0.410
	(0.052)	(0.099)	(0.11)	(0.27)
w_higher		-0.316		-0.114
		(0.14)		(0.457)
Men's age			0.002	0.003
			(0.003)	(0.003)
Household inc			0.000	0.000
			(0.00001)	(0.00001)
Women's age			0.112	0.111
			(0.005)	(0.005)
White			-0.048	-0.041
			(0.032)	(0.032)
Catholic			0.021	0.023
			(0.063)	(0.064)
Protestant			0.104	0.092
			(0.067)	(0.067)
Other religious			0.199	0.230
			(0.097)	(0.099)
Married			-0.069	-0.074
			(0.032)	(0.032)
Age at first birth			-0.132	-0.131
			(0.004)	(0.004)
Urban			-0.039	-0.036
			(0.044)	(0.044)
Constant	1.733	1.778	1.403	1.384
	(0.025)	(0.03)	(0.144)	(0.144)

Source: PNDS 2006

5. Future Directions

- simulations of changes in men's education and their impact in the reproductive behavior, taking into account the educational assortative mating.
- Inclusion of other periods.

6. References

CLIFFORD, P. AND HEATH, A. F.The Political Consequences of Social Mobilit". *Journal of the Royal Statistical Society, series A (Statistics in Society)*, v. 156, n. 1, pp. 51-61, 1993.

SOBEL, M. Diagonal Mobility Models: A Substantively Motivated Class of Designs for the Analysis of Mobility Effects. *American Sociological Review*, v. 46, n. 6, pp. 893-906,1981.

SOBEL, M. Social Mobility and Fertility Revisited: Some New Models for the Analysis of the Mobility Effects Hypothesis. *American Sociological Review*, v. 50, n. 5, pp. 699-712,1985.

SORENSON, A. M. Husbands' and Wives' Characteristics and Fertility Decisions: A Diagonal Mobility Model. *Demography*, v. 26, n. 1, pp. 125-135, 1989.

SORENSON, A. M. and BROWNFIELD, D. 1991. "The Measurement of Parental Influence: Assessing the Relative Effects of Father and Mother". *Sociological Methods Research,* v.19; pp. 511-535.

VAN DER SLIK, F.W.P., DEGRAAF, N. D. AND GERRIS, J. R.M. 2002. "Conformity to Parental Rules Asymmetric Influences of Father's and Mother's Levels of Education". *European Sociological Review*,v. 18, n.4, pp.489-502.

VAISEY, S. 2009. "What People Want: Rethinking Poverty, Culture, and Educational Attainment".