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Intergenerational effects on fertility*

Theory and evidence from Israel

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Abstract. On the assumption that genetic inheritage and experience during adolescence influence the taste for children, the characteristics of a couple's parents may be used to improve on the explanation of fertility which can be obtained from variables that only refer to the couple itself. We find that in Israel fertility depends positively on the mother's siblings and negatively on the grandfathers' wage, but apparently does not depend on the father's siblings. Since fertility also depends positively on the mother's predicted wage, the number of children is positively related to improvements in the economic achievements from one generation to the next.

Introduction

The purpose of this paper is to describe the influence of one generation on the fertility of another. In particular, we wish to connect a couple's fertility with the characteristics of their own parents. It is well documented that fertility depends on economic variables that describe the opportunities and achievements of the spouses themselves.[1] In addition, fertility is influenced by the "taste for children", which is of course not directly observable. However, by assuming that the taste for children is at least partially inherited or determined during adolescence, it becomes possible to obtain information about parents' taste for children by examining the number of their siblings as well as the economic and cultural environment that affected the grandparents' fertility. Consequently, in the absence of a direct measure for tastes, fertility depends not only on the economic variables describing the parents' own opportunities and achievements,

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1 See for example Becker (1960, 1981), Becker and Lewis (1973), Becker and Tomes (1979), Ben-Porath (1973, 1975), Duncan et al. (1965), Easterlin (1966, 1968, 1973), Mincer (1963), and Schultz (1969, 1986).

but also on the number of the parents' siblings and the economic variables that described the grandparents' opportunities and achievements when they were at the childrearing age.

The economic success of the parents' generation relative to that of the grandparents' is therefore of central importance, and our framework encompasses both the Becker and the Easterlin views on fertility.[2] First, consider Becker (1981, chap. 6). He assumes that parents' utility depends on their own consumption, the number of children, and the children's wealth as adults; the latter is determined by the parents' investment in the children, the children's "endowment", and a luck factor. Maximizing the parents' utility subject to the family income constraint (which takes the children's endowment into account), Becker obtains the demand for children as a function of the parents' wealth and the children's endowment. Since the latter is not known, "Children are assumed to receive endowments of capital that are determined by the reputations and 'connections' of their families; the contribution of the genetic constitutions of parents to ability, race, and other characteristics of children; and the learning, skills, and goals acquired though belonging to a particular family culture. Obviously, endowments depend on many characteristics of parents, grandparents, and other family members ..." (Becker 1981, p. 117). Thus, the children's endowment can be extracted from knowledge about the parents' siblings and the grandparents' wealth, and it follows that the "reduced form" demand for children depends on the characteristics of both parents and grandparents.

An increase in the parents' earnings power will both increase their wealth and the cost of the time spent caring for children. Consequently, there will be a substitution effect that tends to reduce fertility and an income effect that tends to increase fertility. The overall effect is therefore ambiguous. However, the link between generations imply that if earnings power has an effect at all, then the parents' and the grandparents' earnings power should affect the parents' fertility in opposite directions. Of course, an increase in the number of siblings should increase fertility.

Next, consider Easterlin (1966, 1968, 1973), whose work is an elaboration of the relative-income hypothesis (Duesenberry 1966). "The basic idea is that if young men – the potential breadwinners of households – find it easy to make enough money to establish homes in the style desired by them and their actual or prospective brides, then marriage and childbearing will be encouraged. On the other hand, if it is hard to earn enough to support the desired style of life, then the resulting economic stress will lead to a deferment of marriage and, for those already married, to the use of contraceptive techniques to avoid childbearing [...T]he material aspirations of a young adult are probably largely formed by his earlier economic socialization experience. Thus young persons who have been raised in households where goods were abundant are likely to have developed relatively high standards of consumption. [...] Thus, the balance between income-earning possibilities of young adults and their desired living levels may be seen as depending largely on the comparative earnings experience [...] of young adults and their parents." (Easterlin 1973, p. 181). It may be added that since sib-

[2] See Sanderson (1976).

lings decrease the abundance of goods available to each during their adolescene, the number of siblings will tend to increase the parents' own fertility. There is therefore a clear presumption that the number of children varies directly with the parents' earnings power and with the number of their siblings, and inversely with the grandparents' earnings power.

In Section 2 we present a model which emphasizes the intergenerational aspect of fertility and captures the essential features of the Becker and Easterlin views. We explicitly allow for independent effects from each parent and grandparent. In particular, fertility may be affected differently by the siblings of each parent and by (the proxies for) the earnings power and cultural background of each grandparent.

In Section 3 we examine the model empirically on the Jewish population in Israel, using data from the Labour Mobility Survey. This data contains information about each parent's education and income from work, each parent's siblings, as well as each grandfather's education and occupation. The Jewish population in Israel consists of two subpopulations with diverse cultural background, and the Israeli experience is therefore particularly interesting.

The intergenerational aspects of fertility have previously been analyzed for the United States and the United Kingdom by Duncan et al. (1965) and for the United States by Ben-Porath (1975). However, because of data limitations, Duncan et al. (1965) could not examine the effects of the father's education, the parents' income, or the grandparents' education and occupation, while Ben-Porath could not examine the effect of the mother's siblings or the maternal grandparents' education and occupation. With our Israeli data we can account for the effect of each parent's siblings and income, and for each grandfather's occupation and education. As in the above studies, however, we have no information about the grandmothers.

2. The model

We assume that the parents' utility can be described by

$$U(C, n, a_m, a_f, T) \ .$$

Here, C is the family consumption and n the number of children. Both C and n have a positive effect on utility. Let $i = m$ for mother and $i = f$ for father. Then a_i is the amount of parent i's time spent on non-leisure activities, and it has a negative effect on utility. One may write $a_i = h_i + b_i(n)$, where h_i is the time parent i spends at work in the market, and $b_i(n)$ is the time parent i spends caring for n children. Finally, T is a taste parameter describing the parents' joint preferences for children. A higher value of T indicates an increased preference for children in the sense that the demand for children is higher for given values of the other parameters. It is assumed that T is obtained by combining the individual preferences of each parent; accordingly, if t_i denotes parent i's preference for children, then one may write $T(t_m, t_f)$, with T increasing in both t_m and t_f.

The parents' budget constraint is given by

$$C = w_m h_m + w_f h_f \ ,$$

where w_i is the wage rate (earnings power) for parent i.[3] Assuming the couple can choose the number of children, they maximize their utility by choosing C, n, h_m, and h_f satisfying the budget constraint. The first-order conditions are

$$\partial U/\partial C - \lambda = 0 \ ,$$
$$\partial U/\partial n + (\partial U/\partial a_m)\partial b_m/\partial n + (\partial U/\partial a_f)\partial b_f/\partial n = 0 \ ,$$
$$\partial U/\partial a_m + \lambda w_m = 0 \ ,$$
$$\partial U/\partial a_f + \lambda w_f = 0 \ ,$$

where $\lambda > 0$ is a Lagrange multiplier. Eliminating λ,

$$(\partial U/\partial a_m)/(\partial U/\partial C) = -w_f \ ,$$
$$(\partial U/\partial a_f)/(\partial U/\partial C) = -w_m \ ,$$
$$(\partial U/\partial n)/(\partial U/\partial C) = w_m \partial b_m/\partial n + w_f \partial b_f/\partial n \ .$$

The interpretation is standard: at the point of maximum utility the marginal rate of substitution between work and consumption is, for each parent, equal to minus the wage, and the marginal rate of substitution between the number of children and consumption is equal to the marginal cost of children. Using these conditions, the demand for children my be written as

$$n = N(w_m, w_f, T) \ . \tag{1}$$

Since the parents' preferences for children are not observable this demand equation is not operational. To eliminate T it is assumed that the parents' tastes for children are, to some extent, inherited from the grandparents or determined during adolescence. In other words, we assume that $t_i(T_i, z_i)$, where T_m (T_f) is the tastes of the maternal (paternal) grandparents, and Z_m (Z_f) is a vector describing the economic and cultural environment that affected the maternal (paternal) grandparent during the parents' adolescence. Although we cannot be certain, the presumption is that there exists a positive relationship between the preferences for children in different generations.[4]

Now, demand function (1) also holds in the grandparents' generation, and we may write

$$n_i = N(w_{mi}, w_{fi}, T_i) \ ,$$

where, for example, n_m is the number of the mother's siblings including herself (i.e., the maternal grandparents' children), and w_{mf} and w_{mm} the wages for the maternal grandfather and grandmother. T_i is of course also not observable, but by inverting the demand function the grandparents' taste for children may be expressed as a function of their wage rates and number of children,

$$T_i = T_i(w_{mi}, w_{fi}, n_i) \ .$$

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[3] Since we have no data on non-labour income, it is not included in the analysis.

[4] See Ben-Porath (1975, p. 398). Becker assumes that endowments, not tastes, are inherited, while Easterlin assumes that the material standard of living in the grandparental home affects fertility directly.

Substituting this into $t_i(T_i, z_i)$, the demand function becomes

$$n = N(w_m, w_f, w_{mf}, w_{mm}, n_m, z_m, w_{ff}, w_{fm}, n_f, z_f) \ .$$

This gives us the number of children as a function of each parent's and grandparent's wage, of each parent's siblings, and of known characteristics of the economic and cultural environment that affected the grandparents. The taste parameters do not enter directly, and all of the variables are in principle observable. Assuming the degree of inheritability is positive, the fertility increases with each parent's siblings. As already discussed, a higher wage will cause both a substitution effect (decrease in n) and an income effect (increase in n). The overall effect of each parent's wage is therefore ambiguous, and it is possible that the fertility is not affected in the same direction by the mother's and the father's wage. However, the effects of the different parameters are related. In particular, a parent's wage and a grandparent's wage would tend to affect fertility in opposite directions.

3. Empirical analysis

The empirical data comes from the Labour Mobility Survey conducted by the Israeli Central Bureau of Statistics in 1977.[5] Our analysis will be based on the subsample of 713 Jewish wage-earner families where both spouses are present and married for the first time, and where the wife is at least 35 years old. Thus, we limit ourselves to intact families in which the children belong to both parents and the families have reached (or are close to) their final size.[6]

The Labour Mobility Survey is particularly suitable for our purpose since it contains information about both parents' family of orientation. Thus, it provides the number of each parent's siblings and the occupation of the two grandfathers (both at the time when the surveyed person was 14 years old). The grandfathers' educational achievements and places of birth are also known. On the other hand, there is no information about the two grandmothers. In Table 1 we show the frequency distribution of the number of children the couple has had,[7] and in Table 2 we list the independent variables used below, giving the means and standard deviations for the quantitative variables and the frequencies for the qualitative variables.

In Table 3 we present ordinary least squares regressions that estimate the number of children for each couple, and in Table 4 we present logit regressions that estimate the logarithm of the odds that a couple has at least five children. As the

[5] The sampling technique is described in Israeli Central Bureau of Statistics (1977).

[6] Since both spouses are present and married for the first time in 83% of the Jewish wage-earner families where the wife is at least 35 years old, there might be a sample-selection bias due to our choice of subsample. However, we can do little more than acknowledge the problem.

[7] The wife was asked to answer the following question: "What is the number of children ever born to you? (including children who died)".

Table 1. Distribution of the number of children ($n = 713$)

Number of children	Frequency [%]	Cumulative frequency [%]
0	4.9	4.9
1	10.9	15.8
2	31.4	47.2
3	22.0	69.2
4	8.5	77.7
5	5.2	82.9
6	4.4	87.3
7	2.7	90.0
8	3.2	93.2
9	2.6	95.8
10	1.4	97.2
11	1.0	98.2
12	0.4	98.6
13	1.0	99.6
14	0.1	99.7
15	0.3	100.0

results of the two sets of regressions are similar, we will mainly refer to the ordinary least squares estimates when we discuss our findings.[8]

In regression (1) only variables pertaining to the couple's own generation are used to explain fertility. The predicted-wage variable[9] contains both a substitution effect and an income effect. Due to the substitution effect a higher predicted

[8] The number of children is of course a discrete variable, but since it can take many different values, estimation by multinominal logit would be impractical. The disadvantage of the logit estimation in Table 4 is that information is lost when the couples are divided into only two groups according to whether they have at least five children or less than five children. When we tried to divide the couples at the third or fourth child, we obtained coefficients similar in signs and significance to those obtained with the division at the fifth child reported in Table 4.

[9] We use predicted wage rather than the actual wage for both parents. This is preferable since the fertility and the actual wage are likely to be simultaneously determined (see Schultz 1986). In addition, the actual wage refers to 1974, which may be decades later than when the children were born. (Indeed, many of the respondents had retired before 1974, and ideally, one would have liked to have estimated wages for the years in which the couple were in their childbearing age.) The predicted hourly wages for mothers and fathers were obtained from the Labour Mobility Survey by regressions for all first-time married working Jewish women not older than 60 years and first-time married working Jewish men not older than 65 years. The couples where the wife was less than 35 years old were included in the estimation of the predicted wages in order to get enough observations.

$$\ln(\text{hourly wage for mothers}) = \underset{(-0.47)}{-0.154} + \underset{(9.64)}{0.073^*}\,(\text{education}) + \underset{(3.16)}{0.055^*}\,(\text{age}) - \underset{(-3.18)}{0.0007^*}\,(\text{age})^2 + \underset{(3.68)}{0.008^*}$$
$$(\text{years in Israel}) - \underset{(-1.44)}{0.092^*}\,(\text{born in Africa or Asia})$$

(205 observations, $R^2 = 0.471$)

$$\ln(\text{hourly wage for fathers}) = \underset{(4.54)}{0.811} + \underset{(2.28)}{0.021^*}\,(\text{education}) + \underset{(2.51)}{0.001^*}\,(\text{education})^2 + \underset{(4.52)}{0.036^*}\,(\text{age})$$
$$\underset{(-4.75)}{-0.0004^*}\,(\text{age})^2 + \underset{(5.42)}{0.006^*}\,(\text{years in Israel}) - \underset{(-3.90)}{0.106^*}\,(\text{born in Africa or Asia})$$

(913 observations, $R^2 = 0.312$).

Table 2. Sample characteristics. Means and standard deviations for quantitative variables and frequencies for qualitative variables, Israeli Jewish families, labour mobility survey (1974) ($n = 713$)

	Mean	Standard deviation	Frequency
Mother's predicted wage (ln)	1.502	0.484	
Father's predicted wage (ln)	1.936	0.284	
Mother's education	8.081	4.592	
Father's education	9.080	4.765	
Duration of marriage	28.919	10.791	
Mother's siblings	3.807	2.470	
Maternal grandfather has low occupational status			0.365
Maternal grandfather did not attend school			0.134
Maternal grandfather from Africa or Asia			0.359
Maternal grandfather from Europe or America			0.615
Maternal grandfather from Israel			0.026
Father's siblings	3.768	2.465	
Paternal grandfather has low occupational status			0.382
Paternal grandfather did not attend school			0.152
Paternal grandfather from Africa or Asia			0.352
Paternal grandfather from Europe or America			0.621
Paternal grandfather from Israel			0.027

Education is measured in years of finished schooling. The predicted wage is defined in footnote 9. Duration of marriage is the number of years the couple has been married in 1974. The number of siblings and the grandfather's occupational status refer to the time when the relevant spouse was 14 years old. The occupational status is obtained by using Tyree's (1981) ranking of occupations in 1974 (in the subsample the minimum status is 12, the maximum status is 87, and occupations with status $\leqq 30$ are said to have low occupational status). Maternal (paternal) grandfather from Africa or Asia means either that the mother (father) is born in Africa or Asia, but not in Israel, or that the mother (father) is born in Israel and the maternal (paternal) grandfather is born in Afcrica or Asia, but not in Israel. Maternal (paternal) grandfather from Europe or America means either that the mother (father) is born in Europe or America, or that the mother (father) is born in Israel and the maternal (paternal) grandfather is born in Europe or America. Maternal (paternal) grandfather from Israel means that both the mother (father) and the maternal (paternal) grandfather are born in Israel.

Footnote 9 (cont.)

These are common wage regressions in the human-capital theory (Mincer 1974), although we use 'age' instead of 'experience'. However, since experience is usually defined as [age − (6+education)], this is inconsequential. We have added two explanatory variables that are specific for Israel (i.e., place of birth and years in Israel).

The problem of sample-selectivity bias is not relevant for the fathers, as more than 85% of the men worked in the relevant years. However, there is a potential problem of sample-selectivity bias for the mothers, as a much smaller proportion of the women worked in the relevant years. To examine if there, in fact, exists a sample-selectivity bias for the mothers we used the two-step technique developed by Heckman (1976, 1979). See also Lee (1983). The first step was to estimate a logit function where the dependent variable = 1 if the woman works = 0 if the woman does not work. This function was then used to construct a correction factor (the inverse of Mill's ratio), which was then used as an additional regressor in the mother's wage equation. As the coefficient of the correction factor was insignificant ($t = 1.58$), we conclude that there is also no sample selection bias for the mothers.

Table 3. Fertility regressions (ordinary least squares), Israeli Jewish families in 1974 ($n = 713$)

	(1) Parents	(2) Parents and maternal grandfather	(3) Parents and paternal grandfather	(4) Parents and both grandfathers
Constant	9.431	1.966	0.087	0.018
	(7.16)	(1.50)	(0.06)	(0.01)
Mother's predicted wage (ln)	3.296	2.763	1.758	2.239
	(4.58)	(4.27)	(2.69)	(3.43)
Father's predicted wage (ln)	−3.737	−1.155	0.589	−0.049
	(−3.60)	(−1.21)	(0.60)	(−0.05)
Mother's education	−0.924	−0.623	−0.537	−0.543
	(−12.38)	(−8.71)	(−7.38)	(−5.48)
(Mother's education)^2	0.028	0.020	0.018	0.017
	(9.07)	(6.80)	(6.10)	(6.04)
Father's education	0.107	0.027	−0.023	0.001
	(2.16)	(0.60)	(−0.50)	(0.03)
Duration of marriage	0.012	0.048	−0.048	0.052
	(1.01)	(4.28)	(4.26)	(4.64)
Mother's siblings		0.089		0.092
		(2.79)		(2.88)
Maternal grandfather has low occupational status		−0.046		−0.078
		(−0.30)		(−0.50)
Maternal grandfather did not attend school		0.610		0.337
		(2.57)		(1.33)
Maternal grandfather from Africa or Asia		2.292		1.197
		(11.35)		(3.29)
Father's siblings			0.027	0.005
			(0.87)	(0.17)
Paternal grandfather has low occupational status			0.302	0.359
			(2.00)	(2.37)
Paternal grandfather did not attend school			0.780	0.701
			(3.35)	(2.81)
Paternal grandfather from Africa or Asia			2.429	1.271
			(11.65)	(3.40)
R^2	0.3516	0.4846	0.4882	0.5067

t-statistics are shown in parentheses.

wage will increase the time spent at work in the market and leave less time to the time-intensive task of caring for children. Due to the income effect a higher predicted wage will decrease the time spent at work in the market and will be associated with more time spent at other activities including caring for children. Consequently, the theoretical impact of the predicted wage is ambiguous. On the empirical level, however, we find that the mother's predicted wage affects fertility positvely, while the father's predicted wage affects fertility negatively.

If the parents' education were not included in the regression, then both the mother's predicted wage and the father's predicted wage would have a negative effect on fertility (-2.47 with $t = -6.64$ for the mother and -0.981 with $t = -1.71$ for the father). A comparable result is obtained by, for example, Schultz (1986). The effect of the mother's predicted wage becomes negative as it includes the effect of education (which is strongly correlated with the wage and then not otherwise present in the regression). Since we are interested in the pure wage effect, it seems preferable to include the education in the regression.

The education variable is often used as a proxy for income, but since we also use the predicted wage as an explanatory variable, the education variable may be considered a measure of the nonpecuniary benefits of education.[10] The mother's education has a nonlinear effect on fertility, with the number of children first decreasing and then increasing (the minimum is reached for 16.5 years of education). On the other hand, the father's education seems to have only a linear effect.[11] At the means the elasticity of the number of children with respect to the mother's education is -1.00, which in absolute value is about 4 times the elasticity of 0.28 with respect to the father's education.

Since mothers spend more time than fathers caring for children,[12] it is likely that the effects of the variables refering to the mother are relatively stronger than the effects of the variables refering to the father. This could explain why, in absolute terms, the elasticity of the number of children with respect to the mother's education is much larger than the elasticity of the number of children with respect to the father's education.

In regression (2) and (3) we add the characteristics of either the maternal grandfather or the paternal grandfather to the explanatory variables. Thus, regression (2) includes the mother's siblings (which is, of course, the number of the maternal grandparents' children minus one) and two proxies for the grandfather's wage, one being a dummy variable which takes the value of 1 if the grandfather did not attend school, and the other being a dummy variable which takes the value of 1 if the grandfather has a low occupational status. To capture the influence of the grandfather's origin, the regression also includes a dummy variable that takes the value of 1 if the maternal grandfather is from Africa or Asia. The origin is a proxy for the social and cultural environment in which the mother grew up. Since the Jewish population in Israel is composed of individuals that come from very different social and cultural environments, this variable is of great importance in explaining economic and demographic differences within the population. As we did not find significant differences that depend on whether the maternal grandfather is from Europe or America, or from Israel, we have merged these possibilities into a single group which is used as the reference group. Regression (3) includes the same variables for the paternal grandfather.

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[10] As, for example, the greater satisfaction from work. Education is also positively related to more efficient family planning, lower infant mortality, and higher-quality child care.

[11] We tried to include (father's education)^2 in the regression, but it did not have a significant effect. We also experimented with other quadratic terms as well as interaction terms, but always without significant effects.

[12] That is, $b_m > b_f$; see Gronau (1976).

Comparing regressions (2) and (3) with regression (1) it is clear that the characteristics of either grandfather do have a significant effect on fertility in the next generation (at the same time the effects of the parents' education are reduced, the effect of the father's education becoming insignificant). The mother's siblings affect the couple's fertility positively, with another sibling increasing the number of her own children by 0.089. However, the father's siblings do not seem to affect the couple's fertility. This is in contrast to Duncan et al. (1965) who found that the number of children is affected equally by the mother's and the father's siblings (about 0.03–0.05 child per sibling depending on the variables they use[13]), and to Ben-Porath who found that the number of children increases by 0.08 for each of the father's siblings (he had no information about the mother's siblings).

The number of children is increased by about 0.6 if the maternal grandfather did not attend school, and by about 0.8 if the paternal grandfather did not attend school. Since not attending school is probably strongly correlated with low wage, this implies that the higher the grandfather's wage, the lower is the fertility in the next generation. This is consistent with Ben-Porath who obtained this inverse relationship with the paternal grandfather's education and income (he had information about the maternal grandfather). The other proxy for the grandfather having a low wage, a low occupational rank, only has a significant positive effect for the paternal grandfather. Thus, as predicted by the theory, we obtain that the mother's wage and the maternal grandfather's wage affect the couple's fertility in opposite directions. Also, note that since the father's wage does not have a significant effect on fertility, the theory is not contradicted by the results for the father.

The continent from which the grandfather has immigrated plays a significant role. Thus, regression (2) shows that a wife whose father comes from Africa or Asia (excluding Israel) has 2.3 more children than a wife whose father comes from Europe, America, or Israel. Similarly, regression (3) shows that a husband whose father comes from Africa or Asia (excluding Israel) has 2.4 more children than a husband whose father comes from Europe, America, or Israel. In African and Asian cultures large families are common, and the variable therefore also reflects taste for children that is not captured by the sibling variable.[14]

Finally, the duration of marriage seems to have an effect. Since this variable measures the number of years the couple has been married in 1974, it is a control variable which captures when the mother was in the childbearing age and hence the external factors (e.g., war rationing, etc.) at that time.[15]

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[13] However, since Duncan et al. (1965) do not provide *t*-statistics for the coefficients, the statistical significance of their results is not known. Duncan et al. also report regression results based on data in Berent (1953). Here they obtain that the number of children is affected more by the mother's siblings than by the father's, but again they do not provide *t*-statistics.

[14] The average number of siblings is 1.3 higher when the grandfather is from Africa or Asia than otherwise. If one does not control for the place from which the grandfather has immigrated, then the father's siblings also have a positive significant effect on the couple's fertility. One reason for this is probably that both the number of siblings and the place from which the grandfather has immigrated reflect taste for children.

[15] We also tried to control for other background variables such as the age difference between the spouses. However, we did not obtain significant effects for these other variables. Likewise, we again tried to include quadratic and interaction terms, but did not obtain significant effects.

Table 4. Fertility regressions (logit), Israeli Jewish families in 1974 ($n = 713$)

	(5) Parents	(6) Parents and maternal grandfather	(7) Parents and paternal grandfather	(8) Parents and both grandfathers
Constant	6.972	−2.619	−4.820	−4.887
	(3.70)	(−1.12)	(−1.88)	(−1.83)
Mother's predicted wage (ln)	2.965	2.509	0.978	2.057
	(3.02)	(2.16)	(0.85)	(1.67)
	[0.267]	[0.186]	[0.083]	[0.177]
Father's predicted wage (ln)	−5.383	−2.435	0.114	−1.217
	(−3.72)	(−1.45)	(0.00)	(−0.64)
	[−0.484]	[−0.180]	[0.010]	[−0.105]
Mother's education	−0.667	−0.427	−0.309	−0.371
	(−6.66)	(−3.64)	(−0.260)	(−3.00)
	[−0.060]	[−0.031]	[−0.026]	[−0.032]
(Mother's education)^2	0.017	0.012	0.009	0.010
	(3.59)	(1.97)	(1.49)	(1.64)
	[0.0015]	[0.0009]	[0.0008]	[0.0009]
Father's education	0.127	0.052	−0.014	0.035
	(1.98)	(0.71)	(−0.17)	(0.43)
	[0.011]	[0.004]	[−0.001]	[0.003]
Duration of marriage	0.002	0.066	0.058	0.072
	(0.14)	(3.25)	(2.93)	(3.44)
	[0.0002]	[0.005]	[0.005]	[0.006]
Mother's siblings		0.101		0.122
		(1.96)		(2.28)
		[0.007]		[0.010]
Maternal grandfather has low occupational status		−0.279		−0.300
		(−1.05)		(−1.08)
		[−0.021]		[−0.026]
Maternal grandfather did not attend school		0.638		0.233
		(1.99)		(0.63)
		[0.047]		[0.020]
Maternal grandfather from Africa or Asia		2.982		2.239
		(8.51)		(3.74)
		[0.221]		[0.193]
Father's siblings			−0.002	−0.027
			(−0.00)	(−0.50)
			[−0.0002]	[−0.002]
Paternal grandfather has low occupational status			0.222	0.319
			(0.88)	(1.08)
			[0.019]	[0.027]
Paternal grandfather did not attend school			0.990	1.015
			(3.29)	(2.94)
			[0.084]	[0.087]
Paternal grandfather from Africa or Asia			2.859	0.860
			(8.20)	(1.45)
			[0.243]	[0.074]
R	0.518	0.644	0.636	0.651

The logit coefficients (b_i) are estimated by the maximum-likelihood method. Asymptotic t-statistics are shown in parentheses, and marginal effects at the sample means of the explanatory variables are shown in brackets. The marginal effects are computed by the approximation rule $b_i p(1-p)$, where p is the probability of the couple having five or more children (see Pindyck and Rubinfeld 1976, p. 253). This probability is 0.105 in (5), and 0.080 in (6), 0.0937 in (7), and 0.095 in (8). The R-statistic measures the predictive ability of the model. It is similar to the usual multiple correlation coefficient, except that it is adjusted for the number of estimated parameters. (See Harrell 1985, p. 183.)

In regression (4) we include the characteristics of both grandfathers, obtaining a further significant increase in the explanation of fertility. The mother's education continues to have a strong *U*-shaped influence on fertility (the elasticity is −0.24), while the effect of the father's education is insignificant. Also, the mother's siblings and predicted wage have positive effects on feritility, while the father's siblings and predicted wage do not appear to influence fertility. It no longer seems to play a role whether the maternal grandfather did not attend school. However, since there is a 0.52 correlation between the two grandfathers not attending school, this is probably because most of the effect on fertility is picked up by the paternal grandfather not attending school. At the same time the paternal grandfather having a low occupational status still increases the number of children.

The results of the logit regression models in Table 4 are similar in sign and significance. In regression (5) for instance, at the mean of the independent variables an increase of 1% in the mother's predicted wage increases the probability of the couple to have five or more children by 0.267%, while an increase of 1% in the father's predicted wage decreases this probability by 0.484%. The relation between the mother's education and the probability for five or more children is *U*-shaped, with the propability first decreasing by 6% for each additional year of schooling, but later increasing. The father's education has a positive influence, with one additional year of schooling implying an increase of 1.1% in the probability of having five or more children. Grandparental fertility, income, education and cultural background [see regressions (6), (7), and (8)] also affect the probabilty of having large families in ways that are similar to the effects expressed in the ordinary least square regressions.

4. Conclusion

Tastes for children are not directly observable and must be proxied by other variables. On the assumption that genetic heritage and experience during adolescence influence the taste for children, one may use the characteristics of a couple's parents to improve on the explanation of fertility which can be obtained by using only variables that refer to the couple's own generation. We have exploited this fact to examine the effects of grandparental fertility, income, education, and cultural background. The study is based on the Israeli experience, and it has the advantage over previous studies that more detailed data on the grandparents are available. In particular, each parent's siblings and each grandfather's occupation and educational achievement are known.

One result is that the number of children increases by about 0.09 for each of the mother's siblings, but seems unaffected by the father's siblings. Another result is that each grandfather's wage (as proxied by the grandfather not having attended school or his occupational status being low) is inversely related to the number of children in the next generation. Additionally, we find that the mother's predicted wage is directly related to the number of children. This direct relationship together with the inverse relationship for the grandfather's income provides

support for the theoretical model and is, of course, comparable to the empirical findings in, for example, Easterlin (1973).

The model permits different effects of the mother's and the father's variables, and we find that empirically the mother's variables dominate the father's. Thus, the effects of the predicted wage and of the education are stronger for the mother than for the father, and the effects of the mother's siblings and of the maternal grandfather's wage are stronger than the effects of the father's siblings and of the paternal grandfather's wage. Finally, fertility is also affected by the grandparents' origin, proxying the parents' social and cultural background.

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