Equality and fertility in the kibbutz

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Abstract. The kibbutz' quest for equality makes a member's consumption independent of his contribution to production, and the kibbutz itself responsible for almost all childrearing expenses. This fundamental departure from the standard organization of economic life of course affects fertility. We find that a parent's predicted wage (as determined by the parent's individual characteristics) has a smaller positive effect on fertility in the city than in the kibbutz, and that a parent's education has a negative effect on fertility in the city and either a smaller negative effect or no effect in the kibbutz.

1. Introduction

The kibbutz is a voluntary collective created by Zionist pioneers motivated by socialist ideology. The kibbutz movement dates from 1909 when the first kibbutz was founded. In 1921 there were 9 kibbutzim (plural of kibbutz) with about 800 members (Barkai 1977 p. 3). By 1961 the number of kibbutzim had risen to 224 and the number of members to 77140, constituting 4.0% of the Jewish population in Israel (Israeli Central Bureau of Statistics 1969). In 1983 there were 267 kibbutzim with 114814 members, which constituted 3.4% of the Jewish population (Israeli Central Bureau of Statistics 1987). The unique feature of the kibbutz is that all members enjoy completely equal consumption possibilities – there is no link between a member's contribution to production and his consumption. Within its means the kibbutz lives up to the Marxian ideal of "from each according to his abilities, to each according to his needs."

Kibbutz members receive no wage, but the kibbutz provides free communal eating, housing, medical insurance, child care, education, etc. To implement the equal consumption possibilities, the kibbutz also relieves parents of child-rearing chores that are their responsibility outside the kibbutz. Some kibbutzim are so involved in child rearing that infants and children sleep in special children's houses, and not in their parents' house. Consistent with the valuation of work for its intrinsic value, members that provide personal services on behalf of the kibbutz are considered on equal footing with members that work in the production branches. [1]

The social organization of the kibbutz has important consequences for fertility. In the city, an increase in a parent's wage rate has an income effect, which increases the number of children (assuming children are a normal good), and a substitution effect, which decreases the number of children. In the kibbutz there is, by definition, no wage rate. If an individual's productivity is representative of all kibbutz members' productivity, an increase in his productivity will have a positive income effect, but there will be no substitution effect. [2] Accordingly, an increase in an individual's long-run earnings capacity in the city should have a smaller effect on fertility than a similar increase in an individual's productivity in the kibbutz. Furthermore, if more education is associated with a higher value of time, there is a negative relation between education and the number of children. In view of the kibbutz' comprehensive involvement in child rearing, this negative association should be stronger in the city than in the kibbutz. Finally, the lower personal cost of raising children in the kibbutz provides a social safety net that reduces the burden for single parents. As more successful marriages are likely to be of longer duration and produce more children, we expect the duration of marriage to have a greater impact on the number of children in the city than in the kibbutz. [3]

In this paper we present a theoretical model that focuses on the differences in fertility between the city and the kibbutz, and use cross-sectional regressions to test the above hypotheses empirically. The individual data are from the latest (1983) Census of Population and Housing in Israel. We have among other things information about the number of children, the years of education and monthly income for each parent, and the duration of marriage. Our findings are as predicted by the model.

Ben-Porath (1972, 1973) has previously analyzed the fertility in the city and the kibbutz within a regression framework. He used aggregate data, however, and had no direct income variables. He found that the mothers' education has a

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[1]   The notion that work is of value in itself received quasi-religious elaboration in the writings of Gordon (1952), a member of the first kibbutz. He argued that physical work is a means of liberating Jews from their socioeconomic past in the Diaspora, where relatively few were manual laborers or worked in agriculture. See Barkai (1977) for an economic analysis of the kibbutz.

[2]   A higher productivity implies a higher alternative cost of children for the kibbutz. So to the extent that individual members pursuit the common good, there will also be a substitution effect in the kibbutz. Such substitution effect, if it exists, is likely to be much smaller than in the city and is therefore ignored in this paper.

[3]   Danziger and Neuman (1989) examine intergenerational effects on fertility in Israel. Unfortunately, the Census provides no information about individuals' parents and siblings, so we are unable to compare intergenerational effects in the city and the kibbutz.

negative effect on the number of children in the city, but an insignificant (positive) effect on the number of children in the kibbutz (the fathers' education has either an insignificant or a negative effect in the city, and an insignificant effect in the kibbutz). He also found some indication of a positive income effect as the number of children increases with the per-capita land in the kibbutz.

2. The model

Let C denote the family consumption, n the number of children, h_i the time parent i works, b_i the time parent i cares for own children, where $i = m$ for mother and $i = f$ for father. The parents' utility function is

$$U(C, n, h_m, h_f, b_m, b_f) \ ,$$

where $\partial U/\partial C > 0$, $\partial U/\partial n > 0$, $\partial U/\partial h_i < 0$, and $\partial U/\partial b_i < 0$. The time needed to take care of n children is $B(n)$, but parents need not supply all the time themselves. In a city parents may pay for child care, while in a kibbutz parents are provided with free child care. If b_0 denotes the time others take care of the children, the child-care constraint is

$$b_0 = B(n) - b_m - b_f \ .$$

In the city, the parents' budget constraint is

$$C = w_m h_m + w_f h_f - w_0 b_0 \ ,$$

where w_i is the wage rate (earnings power) for parent i, and w_0 is the rate the parents pay for outside child care. The parents choose n, h_m, h_f, b_m, and b_f to maximize their utility, given their child-care and income constraints. An internal solution satisfies

$$\frac{\partial U/\partial n}{\partial U/\partial b_m} = \frac{\partial U/\partial n}{\partial U/\partial b_f} = -\frac{\partial B}{\partial n} \ ,$$

$$\frac{\partial U/\partial h_m}{\partial U/\partial C} = -w_m \ ,$$

$$\frac{\partial U/\partial h_f}{\partial U/\partial C} = -w_f \ ,$$

$$\frac{\partial U/\partial b_m}{\partial U/\partial C} = \frac{\partial U/\partial b_f}{\partial U/\partial C} = -w_0 \ .$$

That is, for each parent the marginal rate of substitution between the number of children and the time spent caring for them equals minus the time needed to care for the last child; the marginal rate of substitution between work and consumption equals minus the parent's wage rate; and the marginal rate of substitution

between caring for own children and consumption equals minus the rate paid for outside child care. If the solution is not internal, then $n = 0$ if $(\partial U/\partial n)/(\partial U/\partial C)$ $< w_0 \partial B/\partial n$; $h_i = 0$ and parent i will not work in the market if $(\partial U/\partial h_i)/$ $(\partial U/\partial C) < -w_i$; and $b_i = 0$ and parent i will not care for own children if $(\partial U/\partial b_i)/(\partial U/\partial C) < -w_0$. Together, these conditions characterize the demand for children that can be written as

$$n = N(w_m, w_f, w_0, x) \; ,$$

where x is a vector of parents' personal characteristics. A higher wage rate for a parent is associated with more family wealth as well as a higher cost of caring for own children. There will be therefore be an income effect that, assuming children are a normal good, implies more children, and a substitution affect that implies fewer children. The overall effects of the wage rates are therefore ambiguous. However, since mothers spend more time than fathers caring for children, the substitution effect is likely to be stronger for mothers, and we therefore expect the effect of the mother's wage rate on the number of children to be less than that of the father's wage rate. Educational achievements should be positively reflected in the wage rates and affect fertility in this way. However, we also expect education to have independent effects and therefore to be included in x: more education is likely to lead to jobs that provide more nonpecuniary benefits and facilitate more rewarding leisure activities. Thus, at a given level of income, the opportunity cost of children may increase with education so that the partial effect of education on the number of children is negative. Again, since women play the bigger role in child rearing, we expect the mother's education to have stronger negative effect than the father's.

In the kibbutz, the working hours are institutionally fixed, and the same for men, women and $h_m = h_f = \bar{h}$. Likewise, the family consumption and the child care provided by the kibbutz are not decided by the individual parents, but by the kibbutz, and are the same for all families (with b_0 depending on the number of children). The kibbutz' budget constraint is

$$C = (\bar{w}_m + \bar{w}_f)\bar{h} - \bar{w}_m \bar{b}_0 \; ,$$

where $\bar{w}_m$ and $\bar{w}_f$ denote the average productivity (earnings power) of all mothers and fathers in the kibbutz, and $\bar{b}_0$ denotes the average time of child care provided by the kibbutz. Since the kibbutz almost exclusively uses women to provide its child care, $\bar{b}_0$ has been multiplied by $\bar{w}_m$ to determine the average cost of child care to the kibbutz. Thus, parents do not face an individual budget constraint, but take C, $\bar{h}$, and b_0 for given, and they choose n, b_m, and b_f in order to maximize their utility given the child-care constraint. An internal solution satisfies

$$\frac{\partial U/\partial n}{\partial U/\partial b_m} = \frac{\partial U/\partial n}{\partial U/\partial b_f} = \frac{\partial b_0}{\partial n} - \frac{\partial B}{\partial n} \; ,$$

so for each parent the marginal rate of substitution between the number of children and the parent's time spent caring for them equals minus the time the parents take care of their last child. Notice that the free child care in the kibbutz decreases the absolute value of this marginal rate of substitution. If the solution is not internal, then $n = 0$ if $(\partial U/\partial n)/(\partial U/\partial b_i) \leq (\partial U/\partial n)/(\partial U/\partial b_j) < \partial b_0/\partial n - \partial B/\partial n$; and

$b_i = 0$ and parent i will not care for own children if $(\partial U/\partial b_i)/(\partial U/\partial b_j) > 1$, $i \neq j$. The demand for children may now be written as

$$n = M(C, \bar{h}, b_0, x) \ ,$$

where, as mentioned, C, $\bar{h}$, and b_0 are exogenous to the individual family. Thus, a parent's average productivity should not affect the number of children. However, the family consumption depends on the wealth of the kibbutz, which itself derives from the productivity of the individual members. To the extent that members have similar productivities, the consumption will be positively correlated with the parents' productivities. In the absence of direct data on consumption, there will therefore appear to be a positive income effect. Since there is no substitution effect, this effect is likely to exceed the effect of the wage in the city.[4] The vector x of the parents' personal characteristics again includes their educations.

3. The data

We use data from a 20% sample of the 1983 Census of Population and Housing conducted by the Israeli Central Bureau of Statistics. In order to concentrate on

Table 1. Sample characteristics of Jewish families (both spouses present and married for the first time; the wife at least 35 years old). Census of Population and Housing 1983

	Urban families		Kibbutz families	
	Mean (frequency)	Standard deviation	Mean (frequency)	Standard deviation
Number of children	3.256	2.247	3.237	1.222
Mother's predicted wage (ln)	4.821	0.400	5.062	0.247
Father's predicted wage (ln)	5.205	0.431	5.438	0.270
Mother's education	9.289	4.751	11.879	2.892
Father's education	10.116	4.791	12.117	3.096
Mother's age	51.201	11.572	50.694	11.995
Father's age	55.808	12.438	53.403	12.469
Duration of marriage	29.024	11.267	27.924	11.547
Mother oriental	0.405		0.106	
Father oriental	0.395		0.100	
Mother born in Israel or immigrated before 1948	0.311		0.668	
Mother immigrated 1948 – 64	0.545		0.253	
Mother immigrated 1965 – 71	0.057		0.052	
Mother immigrated 1972 – 83	0.087		0.027	
Father born in Israel or immigrated before 1948	0.333		0.691	
Father immigrated 1948 – 64	0.533		0.247	
Father immigrated 1965 – 71	0.050		0.035	
Father immigrated 1972 – 83	0.084		0.027	

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[4] If parents consider leaving the kibbutz, they might use their productivities in much the same way as the wage rates in the city to determine the number of children.

Jewish families that are intact and have reached (or are close to) their final size, we limit ourselves to Jewish families where both spouses are present and married for the first time, and where the wife is at least 35 years old. This leaves us with 77 455 usable observations for urban families, and 2532 usable observations for kibbutz families.

In Table 1 we summarize the sample characteristics. The number of children refers to those ever born to the woman. As a measure of the wage rates in the city, one would like to use the expected future wage profiles at the time the couples decided on the number of children. The actual wage rates at the time of the Census may be a poor proxy for this measure, both because these wage rates are observed many years later, and because random components make the actual wage rates differ from their permanent levels. To ameliorate this problem, we have estimated hourly earnings functions for urban couples in order to obtain the predicted wages that are used in the empirical analyses.[5] The underlying theory is that a worker's personal characteristics (human capital) determine his productivity, and the wage rate is a proxy for the latter. There is no wage rate in the kibbutz, but similar regressions could ideally be used to determine the predicted productivity in the kibbutz. Since this is not possible due to the lack of productivity data for kibbutz members, we assume that personal characteristics determine productivity in the kibbutz in the same way as in the city. Hence, we assume that kibbutz members are a random sample of the Israeli population, and that there is

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[5]   The predicted hourly wages (for all individuals 25 – 65 years) are obtained from the 20% sample of the Census as follows:

ln (hourly wage for mothers) = 3.117 + 0.116 ∗ education + 0.050 ∗ experience
                               (30.13)   (17.47)   (8.62)

−0.0006 ∗ (experience)^2 − 0.001 ∗ education ∗ experience − 0.111 ∗ oriental
(−6.41)   (−5.48)   (−4.84)

−0.0003 ∗ (immigrated 1948 − 64) − 0.089 ∗ (immigrated 1965 − 71) − 0.198 ∗ (immigrated 1972 − 83)
(−0.01)   (−2.04)   (−6.51)

(3 814 observations, R^2 = 0.2342) .

ln (hourly wage for fathers) = 3.460 + 0.113 ∗ education + 0.054 ∗ experience
                               (60.04)   (32.80)   (17.42)

−0.0006 ∗ (experience)^2 − 0.001 ∗ education ∗ experience − 0.161 ∗ oriental
(−14.55)   (−11.14)   (−13.42)

−0.031 ∗ (immigrated 1948 − 64) − 0.104 ∗ (immigrated 1965 − 71) − 0.267 ∗ (immigrated 1972 − 83)
(−2.59)   (−3.88)   (−12.27)

(12 713 observations, R^2 = 0.2563) .

By definition, experience = age − education − 6.
    The problem of sample-selectivity bias is not relevant for the fathers, as more than 80% of the men worked in the relevant years. However, there is a potential problem for the mothers, as only about 40% of the women worked in the relevant years. To examine if there, in fact, exists a sample-selection bias for mothers, we used a two-step technique developed by Heckman (1976, 1979). See also Lee (1983). The first step was to estimate a probit function where the dependent variable takes the value of 1 if the woman works, and 0 if the woman does not work. This function was used to construct a sample-selection 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 ($t = −1.33$), we conclude that there is also no sample-selection bias for the mothers.

no selectivity bias affecting productivity in the kibbutz. If unobserved components (such as motivation) cause kibbutz members to have different levels of productivity than urban workers with similar characteristics, the estimated fertility effects would be biased. Data limitations do not allow us to correct for such possible bias, and we therefore use hourly earnings functions for the city to obtain the "predicted wages" for kibbutz members.

Education is the number of years of finished schooling, and the duration of marriage is the number of years the couple has been married in 1983. Mother (father) oriental means that the mother (father) is born in Africa or Asia (excluding Israel), or that the mother (father) is born in Israel and the maternal (paternal) grandfather is born in Africa or Asia. All other mothers (fathers) are western, which means that the mother (father) is born in Europe or America, or in Israel and the maternal (paternal) grandfather is born in Europe, America, or Israel.

4. Regression results

In Table 2 we report ordinary least squares regressions estimating the number of children for couples in the city and in the kibbutz.[6] The explanatory power of the socioeconomic variables is much bigger in the city than in the kibbutz. This reflects the limited explanatory power of socioeconomic variables in the kibbutz environment, where idealistic and ideological motives play an important role. The greater homogeneity of the kibbutz population and the social pressure cause a smaller dispersion of family sizes (the standard deviation of the number of children is 2.247 in the city and 1.222 in the kibbutz).

Consider first regressions (1) and (2) that include education and control variables for the mother, but no information about the father. Since the predicted wage is not included, education is primarily a proxy for the value of time. The effect of education is quadratic in the city, with the number of children decreasing with education until reaching a minimum at 13.9 years of education. Education is insignificant in the kibbutz where the value of time is an almost meaningless concept.

To control for the social and cultural background of immigrants from different countries, we include a dummy variable that takes a value of 1 if the mother is of oriental origin (where large families are common). The regressions show that oriental women have 1.663 more children in the city and 0.343 more children in the kibbutz than women of western origin. Since only about 10% of the kibbutz population has an oriental background (in contrast to over 40% of the city population in 1983), the smaller effect of ethnicity in the kibbutz indicates a dominating influence of the norms of the majority with a western background.

The year of immigration to Israel is an important control variable. It captures changes in the composition of immigration by different countries within the oriental and western categories, as well as the socializing effect of the length of residence in Israel. We therefore include a dummy variable with a value of 1 for each of the major periods of immigration after 1948. (The reference group contains those born in Israel or immigrated before 1948.)

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[6]   The number of children is of course a discrete variable, but since it takes many different values (from 0 to 20 in both the city and the kibbutz), estimation by ordinary least squares is likely to yield similar results as estimation by multinominal logit.

Table 2. Fertility regressions (ordinary least squares), Israeli Jewish families in 1983

	(1) City	(2) Kibbutz	(3) City	(4) Kibbutz	(5) City	(6) Kibbutz	(7) City	(8) Kibbutz
Constant	4.295ᵃ	3.657ᵃ	4.165ᵃ	3.332ᵃ	2.401ᵃ	-6.015ᵃ	-3.608ᵃ	-7.651ᵃ
	(108.56)	(13.22)	(97.48)	(10.20)	(-6.97)	(-4.24)	(-10.51)	(-5.26)
Mother's predicted wage (ln)					1.585ᵃ	2.305ᵃ	0.378ᵃ	0.784
					(19.58)	(6.95)	(3.29)	(1.60)
Mother's education	-0.333ᵃ	0.003	-0.283ᵃ	-0.019	-0.444ᵃ	-0.154ᵃ	-0.310ᵃ	-0.076
	(-80.29)	(0.08)	(-61.54)	(-0.44)	(-63.12)	(-3.23)	(-33.68)	(-1.36)
(Mother's education)²	0.012ᵃ	0.0003	0.010ᵃ	0.0009	0.012ᵃ	-0.0009	0.011ᵃ	0.0006
	(58.45)	(0.19)	(46.19)	(0.51)	(55.26)	(-0.49)	(45.17)	(0.32)
Mother immigrated 1948–1964	-0.122ᵃ	-0.269ᵃ	-0.143ᵃ	-0.264ᵃ	-0.131ᵃ	-0.362ᵃ	-0.126ᵃ	-0.335ᵃ
	(-7.58)	(-4.65)	(-8.97)	(-4.56)	(-8.12)	(-6.14)	(-7.88)	(-5.70)
Mother immigrated 1965–1971	-0.166ᵃ	-0.170	-0.219ᵃ	-0.172	-0.021	0.106	-0.067ᵇ	0.093
	(-5.41)	(-1.50)	(-7.23)	(-1.52)	(-0.68)	(0.89)	(-2.17)	(0.78)
Mother immigrated 1972–1983	-0.275ᵃ	-0.655ᵃ	-0.249ᵃ	-0.651ᵃ	0.036	-0.148	0.150ᵃ	-0.067
	(10.67)	(-4.35)	(-9.79)	(-4.32)	(1.19)	(-0.89)	(4.99)	(-0.40)
Mother oriental	1.663ᵃ	0.343ᵃ	0.923ᵃ	0.317ᵃ	1.830ᵃ	0.589ᵃ	0.950ᵃ	0.388ᵃ
	(102.54)	(4.25)	(39.85)	(3.70)	(100.10)	(6.73)	(36.23)	(3.87)
Duration of marriage	0.006ᵃ	-0.014ᵃ	0.009ᵃ	-0.013ᵃ	0.008ᵃ	-0.013ᵃ	0.016ᵃ	-0.010ᵃ
	(9.58)	(-6.03)	(12.99)	(-5.52)	(12.28)	(-5.65)	(20.95)	(-4.11)
Father's predicted wage (ln)							1.316ᵃ	1.675ᵃ
							(15.32)	(4.31)
Father's education			-0.063ᵃ	0.062			-0.159ᵃ	-0.056
			(-14.45)	(1.56)			(-21.15)	(-1.13)
(Father's education)²			0.003ᵃ	-0.002			0.003ᵃ	-0.002
			(16.07)	(-1.16)			(14.38)	(-1.47)
Father oriental			1.007ᵃ	0.094			1.215ᵃ	0.373ᵃ
			(44.24)	(1.11)			(46.18)	(3.55)
R^2	0.312	0.037	0.331	0.039	0.315	0.055	0.336	0.064

t-statistics are shown in parentheses
[a] statistically significant at the 1% level
[b] statistically significant at the 5% level

The duration of marriage in 1983 is also a control variable for external factors (war, rationing, etc.) at the time the woman was in her child bearing age. The effect is higher in the city, presumably reflecting that the costs of single parenting and divorce are higher there than in the kibbutz, where so many child-rearing expenses are covered by the community.

Regressions (3) and (4) also include the father's education and ethnicity.[7] The effect of the mother's education remains quadratic in the city, and it now reaches a minimum at 14.5 years of education. The effect of the father's education is also quadratic in the city, with a minimum at 10.5 years of education. Both parents' education appear insignificant in the kibbutz. In the city, the coefficient of the father's ethnicity is significant and similar to that of the mother's ethnicity. In the kibbutz, only the mother's ethnic origin affects fertility: Women of oriental origin have 0.317 more children as compared to a 0.923 more children in the city.

In regressions (5) and (6) we add the mother's predicted wage to her education as an explanatory variable, but include no information about the father. Education is now not a proxy for earnings power, but is primarily a taste variable. The effect of the predicted wage on the number of children is positive in both the city and the kibbutz, and, due to the absence of a negative substitution effect in the kibbutz, is bigger in the kibbutz. The effect of education is still quadratic in the city. The effect appears to be linear in the kibbutz, and, for all relevant years of education, much less negative than in the city. The reason is that a woman benefits more from education in the city; in the kibbutz many women traditionally work in the provision of personal services, so a women is more likely to work in her speciality in the city than in the kibbutz.[8]

Finally, in regressions (7) and (8) we include both parents' education and predicted wage. The effect of the father's predicted wage is positive in both the city and the kibbutz, and bigger in the kibbutz, again because of the absence of a negative substitution effect in the kibbutz. The effect of the mother's predicted wage remains positive, but is reduced and less than the father's predicted wage. In the city this is as expected, since the substitution effect is stronger for the mother. In the kibbutz there is no substitution effect, so it is probably because the father's predicted wage is a better proxy than the mother's predicted wage for the overall productivity (this is consistent with the effect of the mother's predicted wage being significant only at the 11% level). The effect of the mother's education remains quadratic in the city, and still appears to be negative and linear in the kibbutz, but is now insignificant. The effect of the father's education is also insignificant in the kibbutz.[9]

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[7]   We did not enter the year of the father's immigration as it is highly correlated with the year of the mother's immigration.

[8]   Even though the kibbutz is committed to full equality between women and men, job segregation is smaller in the city than in the kibbutz (Neuman 1991). See also Tiger and Shepher (1975) and Spiro (1980) for a description of women's roles in the kibbutz.

[9]   In order to examine whether the women that join a kibbutz are a biased sample of all Israeli women, we again applied Heckman's procedure. We first estimated a probit function where the dependent variable is 1 if the woman lives in a kibbutz, and 0 if she does not. We then constructed a sample-selection correction factor that was used as an additional regressor in each of regressions (1)−(8). The coefficient of the correction factor was insignificant in most cases, and its inclusion caused only a marginal change in the size and significance level of the coefficients of the independent variables. We therefore conclude that there is no sample-selection bias in the fertility regressions.

5. Conclusion

The kibbutz' quest for equality makes a member's consumption independent of his contribution to production, and the kibbutz itself responsible for almost all child-rearing expenses. This fundamental departure from the standard organization of economic life of course affects fertility, and we have examined how the fertility responds differently to economic variables in the city and in the kibbutz. In particular, we have found that a parent's predicted wage (as determined by the parent's individual characteristics) has a smaller positive effect on fertility in the city than in the kibbutz, and that a parent's education has a negative effect on fertility in the city and either a smaller negative effect or no effect in the kibbutz.

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