Israel Economic Review Vol. 6 No. 1 (2008), 1–22

THE EFFECT OF CHILD ALLOWANCES ON FERTILITY IN ISRAEL

RONI FRISH [*]

The steep increase in payments of child allowances to households headed by citizens who did not serve in the Israel Defense Forces provides a quasi-natural experiment for testing the effect of economic incentives on fertility. The child allowance increased for some of the Druze and Bedouin populations and almost for all the Muslim population. This paper examines the change in the birthrate of women whose child allowances increased (i.e., women whose husbands did not serve in the army) as against that of similar women whose child allowances did not increase. We found that the increase in child allowances increased the completed fertility rate of Druze women but did not affect the fertility of Bedouin and Muslims.

JEL classification: J13, H53
Key words: fertility, child allowances, natural experiment, difference-in-differences

1. INTRODUCTION

This study examines the effect of child allowances on fertility in Israel. We focus on the dramatic increase in child allowances paid to non-veterans of the Israel Defense Forces (IDF) (henceforth, non-veterans), a change occasioned by the delinkage of military service and this social benefit. The increase in child allowances for this group began in 1994 and affected the majority of Israel's non-Jewish population. This change provides a convenient opportunity to analyze the relationship between child allowances and fertility for several reasons. First, the increase in child benefits (starting from the third child) was very large relative to the wages and per capita consumption of the non-Jewish population. Second, the change was permanent, since the Supreme Court criticized the linkage between military service and social-security benefits as illegal discrimination. Finally (but most important), since some Druze and Bedouin were army veterans while the others were not, we can compare the change in birthrate of women married to non-veterans with that of very similar women who were married to veterans. We use the difference-in-differences technique to compare the fertility rates of wives of veterans and non-veterans – a comparison that may minimize the social unobservable effects on the fertility rate such as secularization and change in women's social status.

At first glance, the total fertility rate of the Arab-Muslim population did not seem to change as a result of the increase in the child allowance (Fig. 1 – Appendix). The total fertility rate remained essentially unchanged from 1986 (seven years before the beginning

[*] Bank of Israel, Research Department. Email: ronnif@boi.gov.il

of the period of increase in the child allowance) until 2001 (four years after the end of the period). By implication, the increase in the child allowance had no significant effect on fertility. However, two findings tend to contradict this conclusion: First, the total fertility rate among the Druze population, which did not benefit from a similar increase in the child allowance, declined continuously during this period. Second, the total fertility rate among the Muslim population stabilized during this period after twenty years of continuous decline. Thus, general impressions cannot be relied upon in this case; a micro-analysis is required in order to examine the influence of child allowances on fertility.

This study is divided as follows: Section 2 presents brief review of the literature; Section 3 presents background information and a description of the database. Section 4 analyzes the effect of the child allowance on Druze and Bedouin. Section 5 examines its effect on the Muslim population. Section 6 concludes.

2. BRIEF REVIEW OF THE LITERATURE

Numerous empirical studies have analyzed the effect of government policies aimed at increasing birthrates in industrialized countries. Most of them have found a positive and significant effect for the influence of government policy on the birthrate but there are those who claim that government policy only influences the timing of births and that its long-term effect is negligible. For example, an empirical study examines the long-term trends in Germany. The birthrates in East and West Germany were almost identical until 1976; however, in 1976, East Germany instituted a policy to increase the birthrate which brought it to a level that was 0.4-0.5 births per woman higher than West Germany's. When the communist era came to an end, the birthrate fell back to its former levels. Despite the decrease in the birthrate, the question remained whether the decline in births per woman was real. Kreyenfeld (2001), for example, claims that the decline in the birthrate in East Germany was only a change in the timing of births. In other words, it resulted from an increase in the average age at which women gave birth and did not represent a change in the final number of births per woman. Another example of government intervention took place in Quebec where the government also attempted to increase the birthrate. In this case, the birthrate remained low like those in other Canadian provinces.

Bjorklund (2002) analyzed the influence of government policy on fertility in Sweden during the period 1960 to 1980. The Swedish policy primarily affected working women through the subsidization of day care, longer paid maternity leaves, paid absences to care for sick children and universal child allowances. A comparison of the birthrate in Sweden before and after the institution of the policy showed that it remained stable (approximately two births per woman) in contrast to a decline of 0.4-0.5 births per woman in other Scandinavian countries which did not adopt a policy to increase birthrates. However, according to Bjorklund, the influence of government policy on fertility was not as strong as he had expected, and the similarities between the countries (in the timing of births and between groups with similar levels of education) were greater than the differences.

Gauthier and Hatzius (1997) used macro data to carry out a panel study for industrialized countries during the period 1970 to 1990 which for each year and each

country included the birthrate (as the dependent variable) and the size of the child allowance (as an independent variable). The researchers added additional explanatory variables such as the average level of education for men and for women and the rate of unemployment. It was found that the effect of an increase in child allowances was significant but not very large. Thus, an increase of 25 percent in child allowances raised the number of births per woman from 1.71 to 1.78. A similar study carried out previously by Blanchet and Ekert-Jaffe (1994) found that the difference in child allowances between France (where it is high) and England (where it is low) led to a difference of 0.2–0.3 births per woman.

Barmby and Cigno (1990) used micro data on 1,612 married women in England. The data included the birth history of each woman over a period of ten years as well as data on the age of the woman, her profession and her level of education. Using this data together with macroeconomic data, a wage profile was constructed for each woman, which also served as an explanatory variable. The other variables included the size of the child allowance, age, level of education, profession and work experience. The research showed that an increase in the child allowance for the first child raises the number of children per woman and shortens the time from the wedding to the first child. However, increasing the child allowance for the second child did not have a significant effect.

Manski and Mayshar (2000) analyzed the influence of child allowance policy on the birthrate in Israel. They focused on the transition from tax credits to universal child allowances which took place in 1970 and its long-term influence on fertility. They found that the complete birthrate among Ashkenazi ultra-orthodox women increased sharply during the period following the transition (1975–79); however, "among the main segments of the population there were no significant changes in overall fertility trends in the early 70s." The researchers claimed that the increase in the birthrate among the ultra-orthodox was a result of the combination of their ideology, which gives higher priority to childbearing than economic welfare, and the increase in government transfer payments to them, including child allowances.

3. BACKGROUND AND DATABASE

a. Changes in the size of child allowances during the 1990s

The child allowances that were paid to most Arab households increased gradually between 1994 to 1997 due to the discontinuance of previous discrimination. In 1975–1993, households that were denied "army veteran" status received the local-currency equivalent of USD 65 per month for each of their first two children and USD 82 for each additional child. In 1997–2001, following the equalization of eligibility, the child allowance for third and subsequent children was increased as follows: about USD 100 for third children, USD 200 for fourth children, and about USD 170 for fifth children and above. (See Table 1 and Tables A.1 and A.2 in the Appendix.)

Table 1
Child Allowance Paid to Non-Veteran Households for Third and Subsequent Children, 1993 and 1997 (constant prices)

	Monetary value USD		Increase in child allowance between 1993 and 1997	
	1.1.1993	1.8.1997	USD	As share of per-capita consumption in 1999[1]
3rd	82	98	16	8%
4th	82	199	117	32%
5th	82	167	85	24%
6th	82	184	102	28%
7th+	82	172	90	25%

[1] Increase in child allowances for non-veterans as share of per-capita consumption of the non Jewish population.

Child allowances constitute a significant proportion of the Arab population's income because child allowances paid in Israel are very generous and because the Arab population has a relatively low per-capita income. The low per-capita income in the Arab population traces to the low wage earned by men, the low workforce participation rate among women (primarily in the Muslim population), and the high number of children per household. Thus, according to the 1999 Income Survey, the child allowance for fourth children constitutes 32 percent of the per-capita (private) consumption of non-Jewish households. For comparison, in Germany, which pays a particularly generous child allowance in order to encourage births, the child allowance for the fourth child constitutes only 14 percent of per-capita consumption, and in France the proportion is 12 percent. (See Appendix Table A.3.)

b. Data and empirical strategy

The database is drawn from the Population Registry of the State of Israel and data from the National Insurance Institute. The Registry records **all** citizens in Israel and includes information about all births in Israel (until 2001) and information about marriages and divorces, place of residence, and ethnic group (Muslim, Druze, etc.). The Population Registry data were merged with those from the National Insurance Institute, which offer information about the level of child allowances paid in 1995 and data on employees' labor income in 1992–95. This dataset allows us to distinguish between families that were eligible for an enlarged child allowance (labeled as 'veterans') and families that were not (labeled as 'non-veterans'), although this is true only for families with three or more children in 1995. (The child allowance for the first two children was identical in both cases.)

The strategy used to estimate the effect of child allowance on birthrates is based on the difference-in-differences method. We analyze the change in the fertility of the "treated" group (wives of non-veteran husbands) relative to that in the control group (wives of veteran husbands) during the "treatment period." The women in the control group are married to veterans and have been eligible for enlarged child allowances since the 1970s. The treatment group, made up of 'non-veterans' wives, has been eligible for enlarged child

allowances only since 1994. The treatment period is 1994–2001. The success of the difference-in-differences method estimating the effect of the child allowance is critically dependent on the similarity in fertility patterns between the treatment and the control groups. Thus, we will compare women from the same ethnic group. (Army-veteran Bedouin are compared with non-veteran Bedouin; army-veteran Druze are compared with non-veteran Druze). This comparison may help us to neutralize trends and shocks to the fertility rate that are not related to the child allowance policy. We will not use the difference-in-differences technique for the Muslim population (which accounts for about 70 percent of the non-Jewish population of Israel) because almost all Muslims are non-veterans. Hence, we use indirect and less-convenient methods to estimate the effect of the child allowance on the Muslim population.

4. THE EFFECT OF CHILD ALLOWANCES ON FERTILITY OF DRUZE AND BEDOUIN WOMEN

a. The effect of the child allowance within a population group

1. Descriptive statistics

This section focuses on two main ethnic groups: Bedouin and Druze. These populations were chosen because in each group some men served in the Israel Defence Forces and others did not, resulting in a perceptible difference in the child allowances that different households within the groups received. Although both populations are Arabic-speaking Israelis, they have characteristics that clearly mark them apart from the other Arab citizens of the country. The Druze have a unique religion that broke away from Shi'ite Islam in the eleventh century; they live in northern Israel, Lebanon, and Syria and have no aspirations to national independence. In 2005, about 100,000 Druze held Israel citizenship. (Approx. 18,000 additional Druze on the Golan Heights are not Israel citizens and are not included in this study.) The Bedouin in Israel are Muslim Arabs whose forebears were nomadic or semi-nomadic. They fall into two groups: Bedouin in northern Israel, who inhabit towns and villages, and Bedouin in the south (approx. 170,000), who live in towns and unrecognized villages or are still semi-nomadic. Neither the Bedouin nor the Druze allow ethnic exogamy.

Table 2 gives an impression of the socioeconomic indicators of the various groups.[1] At one extreme is the Bedouin population of the south, the most traditional population group in the study. The women of this group are noted for very high fertility and very low mean schooling and employment rates. This population is also the poorest in terms of the wages of employed men. At the other extreme is the Druze population in the vicinity of metropolitan Haifa. The fertility rate of Druze in Haifa District is relatively low and

[1] Bedouin in northern Israel were identified on the basis of homogeneous places of residence and by religion (Islam). Those in the Southern District were identified on the basis of religion. Identification of the Druze is direct.

women's schooling and employment rates are relatively high (even though the median marriage age is very low). In the middle are the Druze in the Northern District (not including those on the Golan Heights) and the Bedouin in the Northern District, both of whom are undergoing modernization. As for military enlistment and army-veteran status, most of the Druze population, especially those in the Northern District, serve in the army and are therefore defined as army veterans. In contrast, most Bedouin, especially in the south, do not belong to the class of army veterans. Accordingly, their child allowances increased steeply in the mid-1990s.

Table 2
Descriptive Statistics: Means by Ethnicity and District for Mothers up to Age 45 (in 1995)

	Bedouin in Southern District	Bedouin in Northern District	Druze in Northern District	Druze in Haifa District
Rate of working mothers (percent)	9	30	33	37
Mother's years of schooling	4.3	7.9	9.1	9.5
	(6.1)[a]	(3.8)	(6.2)	(4.8)
Median age at marriage	22.8	21.3	20.6	20.9
	(6.2)	(5.1)	(4.7)	(5.3)
Spouse's wage, 1992–94	3,538	4,163	5,701	5,897
	(3,032)	(2,956)	(4,006)	(4,643)
Share of veterans (percent)	12	33	94	84
Observations (N)	13,858	5,904	8,866	3,070
Number of births by age 45–50[b]	8.1	6.8	5.9	4.3
	(3.5)	(2.9)	(2.4)	(1.6)
Observations (N)	1,701	893	1,354	565

[a] Values in parentheses are standard errors.
[b] The number of births by the 45–50 age cohort serves as an estimate of the completed fertility rate (the data pertain to 2001).
Sources: Population Registry and National Insurance Institute (wages and employment) in regard to the entire population. The source of the data on women's schooling is the 1995 Population Census, which included 20 percent of the population.

The treatment group is composed of women who are married to men who did not serve in the army; the control group is made up of women married to army veterans. To distinguish between the groups, we have to limit the sample to mothers who had more than two children in 1995 because non-veterans and veterans received the same child allowances for their first two children. Once we identified a certain mother in 1995, we were able to track her fertility history before and after 1995 (up to 2001). By consulting Table 3, we may gauge the differences between the veterans (control group) and the non-veterans (treatment group) in each of the four populations. We found strong similarities between the treatment group and the control group in several important indicators: the mothers' employment rate, schooling, and age upon marriage. The wages of army-veteran were significantly higher than those of non-veterans, army-veterans were much older than non-veterans (except for

the Druze in the North), and the fertility rates of veterans' wives were higher in 1993, shortly before the change in policy. Since there are meaningful differences between the treatment group and the control group in terms of parents' age (mothers' age and spouses' age), the effect of the treatment (the policy change) on the treatment group and on the control group cannot be examined by simple means of the difference-in-differences method.

Table 3
Descriptive Statistics: Means by Ethnicity, District, and Army-Veteran / Non-Veteran Status (mothers up to age 39 in 1993)

	Bedouin in Southern District		Bedouin in Northern District		Druze in Northern District		Druze in Haifa District	
	Non-veteran	Veteran	Non-veteran	Veteran	Non-veteran	Veteran	Non-veteran	Veteran
1.Number of births 1994–2001 (Row 3 *minus* Row 2)	**2.70** (1.6)	**2.42** (1.7)	**1.45** (1.2)	**1.33** (1.2)	**1.26** (1.0)	**1.05** (1.0)	**0.84** (0.8)	**0.56** (0.7)
2. Number of births by 1993	4.9 (2.6)	5.8 (2.7)	4.3 (2.0)	4.7 (2.0)	3.6 (1.8)	4.3 (1.8)	3.1 (1.1)	3.8 (1.2)
3. Number of births by 2001	7.6 (2.4)	8.2 (2.7)	5.8 (1.9)	6.0 (1.9)	4.9 (1.7)	5.4 (1.6)	3.9 (1.0)	4.3 (1.2)
Mother's age in 1993	28.7 (5.5)	30.3 (5.4)	30.3 (4.9)	30.8 (4.9)	30.8 (4.6)	31.1 (4.6)	30.8 (3.8)	32.6 (4.0)
Spouse's age in 1993	32.6 (8.2)	35.0 (8.3)	34.2 (5.9)	35.1 (6.3)	35.6 (7.1)	35.1 (5.6)	35.0 (4.3)	36.9 (5.0)
Mother's age upon marriage	22.0 (5.8)	22.9 (6.7)	20.3 (4.1)	20.1 (4.1)	21.2 (5.0)	19.7 (3.9)	20.3 (4.4)	19.8 (4.8)
Spouse's wage, 1995 (NIS)	3,846 (3,283)	4,457 (3,394)	4,130 (2,893)	5,290 (3,590)	5,264 (3,774)	6,561 (4,231)	5,565 (4,054)	6,911 (5,273)
Mother's years of schooling -	3.3 (5.4)	3.1 (4.6)	7.7 (3.2)	7.2 (3.6)	8.7 (3.3)	8.1 (3.3)	7.5 (2.4)	8.4 (3.1)
Share of working mothers (%)	6	4	18	17	20	18	18	23
Observations (N)	6,328	827	1,921	916	253	3,799	188	880

[1] Values in parentheses are standard errors.
* Women's schooling is based on a subsample of 20 percent of the population.

A rough comparison of the fertility trends of the two groups (treatment and control) shows that in all four population groups fertility increased more quickly in the treatment

group than in the control group during the treatment period. Some of the difference among them in fertility traced to differences in parents' age (mothers and spouses). Parents in the control group were older than those in the treatment group because enlistment rates among Bedouin and Druze have been declining over the years (except for Bedouin in the north). Appendix Table A.5 examines the probability of a man's (i.e., spouse's) enlisting in the army as a function of age and age-squared. A significant difference was found in the enlistment rates of the Bedouin population and the Druze in Haifa District, and among the Druze in the Northern District the enlistment rate rose at first and declined only afterwards. Since army-veteran spouses are naturally older, their wives are also older, they had more children in 1993, and their fertility rate during the treatment period was lower. To examine the effect of the policy change using the difference-in-differences method, one must compare spouses (fathers) of the same age and not rely on a rough comparison, because the age differences also affect the differences in fertility.

Table 4 makes it possible to examine the effects of the policy change by equalizing the ages of husbands (spouses) in the treatment group and in the control group. To perform the equalization, the mothers were sorted into cells by husbands' year of birth (men above age 45 in 1993 were deleted from the sample) and the wives' membership in the treatment and control group. The sorting was performed separately for each ethnic group. The result was a large number of pairs of cells – a control cell and a treatment cell – each pair containing an identical population of mothers in terms of spouse's age, ethnic group, and district of residence. In Stage 1, the mean of the various indicators of the mothers in each cell was calculated (mean age of mother in the cell, mean number of children in the cell, etc.) and in Stage 2 a simple mean (of the means of the cells) was calculated for all cells belonging to a specific ethnic group (separately for the treatment and control groups). We should emphasize that the table tracks the fertility patterns of a specific group of women before and during the treatment period (1993-2001), i.e., there was no turnover among the women in the sample. The results are shown in Table 4. The table highlights the strong similarity between the treatment and control groups among Bedouin in the south and Bedouin in the north, in terms of the number of children they had had before the legislative changes (in 1992) and in mothers' age. Since the fertility patterns of Bedouin mothers in the treatment and control groups were so similar, we were able to settle for a difference-in-differences comparison to estimate the effect of the policy change on the fertility of those treated (taking into account the differences in spouses' age). Such a comparison among the Bedouin shows that the fertility rates among the treatment group and the control group were quite similar both before and after the treatment, the number of births during the treatment period was only slightly higher than that of the control group (the difference found – 0.03 births per woman in the eight years of treatment – is statistically and economically insignificant), and, practically speaking, the policy change had no evident effect to speak of on the fertility of the Bedouin treatment group.

The policy change did have a perceptible effect on Druze mothers in northern Israel. Since a large difference was found between the treatment group and the control group in the number of these mothers' births up to 1993, one must be doubly careful when comparing the groups. Evidently, however, the policy change increased the fertility of the mothers whom it affected. Until 1993, the fertility of the control group was significantly higher than

that of the treated group. Had the trend continued, we would expect the control group to display higher fertility during the treatment period (1993–2001) as well. The fact that the groups switched places during the treatment period – the treatment group showed a higher fertility rate – is meaningful evidence that the policy change increased the fertility. A similar but weaker phenomenon was found among Druze women in the Northern District. Among them, too, the treatment group had a lower fertility rate until 1992 and a higher rate during the treatment period (after 1992). However, the differences in fertility between the periods were smaller and the number of observations of the control group was rather small.

Table 4
Number of Births of Veteran and Non-Veteran Women in the Treatment Period, Balanced by Ethnic Group, District of Residence, and Spouse's Age (mothers up to age 39 and spouses up to age 45 in 1993)

	Bedouin in Southern District		Bedouin in Northern District		Druze in Northern District		Druze in Haifa District	
	Non-veteran	Veteran	Non-veteran	Veteran	Non-veteran	Veteran	Non-veteran	Veteran
1. Number of births 1994-2001 (Row 3 *minus* Row 2)	2.53	2.50	1.45	1.43	1.26	1.17	0.89	0.76
2. Number of births by 1993	5.4 (2.2)[1]	5.6 (2.2)	4.4 (1.7)	4.7 (1.8)	3.7 (1.1)	4.3 (1.5)	3.3 (0.9)	3.6 (0.9)
3. Number of births by 2001	7.9 (1.1)	8.1 (1.2)	5.9 (0.9)	6.1 (1.0)	5.0 (0.7)	5.4 (0.7)	4.1 (0.7)	4.3 (0.4)
Spouse's age in 1993	32.5 (7.6)	32.5 (7.6)	33.5 (7.1)	33.5 (7.1)	34.0 (6.8)	34.0 (6.8)	35.0 (6.2)	35.0 (6.2)
Mother's age in 1993	29.9 (5.9)	30.0 (6.0)	30.6 (5.6)	30.6 (5.5)	31.0 (5.1)	31.0 (5.4)	31.4 (4.5)	31.4 (5.4)
Observations in cell (mean) (N)	210	26	82	40	11	174	9	44
Cells (N)	26		24		23		21	

[1] Values in parentheses are standard errors. The women in each of the four population groups (Bedouin in the south, Bedouin in the north, etc.) were first sorted into treatment and control groups and each group was sorted again on the basis of husbands' age, so that the age of all husbands in that cell is the same. For example, Bedouin women in the north were sorted into 24 cells according to their husbands' age that ranged from 22 to 45 years (24 age groups). Each cell in the treatment group contained 82 women on average. For each cell we calculated the average number of births at two points in time: 1993 and 2001. The table presents a simple mean of the means of the cells. (Therefore, the fathers' age in the two groups, treatment and control, is the same.) Importantly, the number of births up to 1993 and in 1993–2001 is attributed to the same group of women (i.e., the women in each cell are constant; none was replaced.)

To examine the effects of the policy change on those affected by it, we tracked mothers who had a similar fertility history until 1993 and compared their behavior in the years that followed (1994–2001). The implicit assumption behind this inquiry is that the total number of planned births determines fertility in the young age cohorts. This test seems useful prima facie because there are significant differences between the fertility patterns of the treatment group and those of the control group (up to 1993) among Druze women generally and those in the north specifically. The differences in fertility immediately before the legislative change reflect differences in exogenous variables (observed and unobserved) such as women's level of schooling, status of women in society, the influence of religion, tastes, etc. These differences suggest that the assumption about the existence of similar fertility trends between the control group and the treatment group may not be valid. It being impossible to control for all variables that affect fertility, we used the number of births at young age as a proxy for total planned fertility.

Table 5 compares mothers in the treatment group with mothers in the control group who had a similar fertility history immediately before the legislative change: those who had the same number of births in 1993 and were of the same age. To perform the comparison, the mothers were sorted by how many children they had in 1993, their age group, ethnicity, district of residence, and membership in treatment group or control group. In all, we obtained about 100 pairs of control cells and treatment cells (for each of the four ethnic groups) that had identical indicators in four respects: number of children in 1993, mother's age, ethnicity, and district of residence. In Stage 1, we calculate the mean of traits within each cell (e.g., number of children in 2003). In Stage 2, the means of all cells populated by a homogeneous group (treatment group of Bedouin in the south, etc.) were averaged. The results are shown in Table 5. Obviously, members of both the treatment and the control groups had the same number of children in 1993 and same mother's age (because the table was structured that way). By tracking the number of births that the same women had in the following eight years, we found that among the Druze the treatment group had fewer births than the control group. This outcome actually contradicts the results obtained in Table 4, which showed that the policy change led to more births among Druze women. The results for the Bedouin in the north and south reinforce the conclusion that the policy change had only a negligible effect on them.

The contradiction in the effect of the policy change on the fertility of Druze women in the north exists because we controlled for the number of births in 1993. In Table 4, we assumed that the differences in fertility between the control and the treatment groups in 1993 would persist or widen in subsequent years. In practice, the fertility gaps narrowed. Therefore, we deduced that the policy change had increased fertility. In Table 5, we compared the treatment group with a control group that apparently had similar characteristics, i.e., we compared the mothers in the treatment group with a subsample of mothers in the control group that exhibited low fertility in 1993. We found that the mothers in the latter group became more fertile in subsequent years and narrowed the gap between themselves and the other mothers in the control group. This suggests that the choice of members of the control group who exhibited low fertility in 1993 created a selection bias. The low fertility rate among young members of the treatment group does not always reflect a wish to have fewer children; instead, some women in the control group who wished to

have many children did not fulfill their wish while they were young and, therefore, accelerated their fertility in subsequent years. (This did not happen in the treatment group because women in this group had lower planned fertility; therefore, in this group there was no selective choice of women who had under-average fertility.) Therefore, the treatment group should not be compared with a control group of low-fertility women in 1993, as is done in Table 5.

Table 5
Number of Births of Treated and Untreated Women during the Treatment Period, Balanced by Ethnicity, District, Mother's Age, and Number of Children in 1993

	Bedouin in Southern District		Bedouin in Northern District		Druze in Northern District		Druze in the Haifa District	
	Non-veteran	Veteran	Non-veteran	Veteran	Non-veteran	Veteran	Non-veteran	Veteran
1.Number of births 1994-2001 (3-2)	2.50	2.54	1.25	1.25	1.40	1.51	0.88	0.92
2.Number of births by 1993	5.7 (2.4)	5.7 (2.4)	4.9 (2.0)	4.9 (2.0)	2.9 (1.0)	2.9 (1.0)	2.7 (0.5)	2.7 (0.5)
3.Number of births by 2001	8.2 (2.0)	8.3 (2.2)	6.1 (1.5)	6.1 (1.5)	4.3 (0.6)	4.4 (0.6)	3.6 (0.3)	3.6 (0.3)
Mother's age in 1993	30.1 (5.0)	30.1 (5.0)	31.3 (5.1)	31.3 (5.1)	29.5 (3.8)	29.5 (3.8)	30.0 (3.7)	30.0 (3.7)
Spouse's age in 1993	32.7 (4.4)	33.1 (4.7)	34.6 (4.1)	34.9 (4.0)	33.5 (2.7)	32.8 (2.8)	34.2 (2.8)	33.9 (2.4)
Observations in cell (mean) (N)	50.2	6.8	20.1	9.7	5.5	56.4	7.4	17.7

We also used OLS regressions to examine the effect of the increase in child allowances on fertility among Druze and Bedouin women. We employed the same database that was used in Tables 2–5. The database includes all married Bedouin and Druze women (excluding those on the Golan Heights) who were aged 20–39 in 1993 and could be attributed to the treatment group or the control group, i.e., women who had more than two children in 1995. The explained variable in all regressions was the number of births by woman *i* during the 1994–2001 period. Model 1 includes a minimal set of explanatory variables, three dummies for the various population groups (Bedouin in the Southern District, Bedouin in the Northern District, and Druze in the Northern District – the dummy variable for Druze in Haifa District was omitted), and a dummy variable for the treatment group – women not married to army veterans, whose child allowances increased from 1994 onward. The estimation of the treatment-group coefficient corresponds to the results obtained by a simple difference-in-differences comparison of the treatment group with the control group (much as is done in Table 4). In this model, a significant increase in the fertility of the treatment group was found. The insertion of two alternative explanatory

variables – Spouse's (husband's) age or Mother's age (Model 2 and Model 3, respectively) – rendered the treatment-group coefficients insignificant. As we have seen, the inclusion of Spouse's age is crucial because the army enlistment rates have been declining over the years, resulting in differences between the treatment group and the control group in terms of parents' age.

Models 4 and 5 repeat Models 2 and 3 and examine the effect of the child allowances only on the Bedouin populations. Once again, we found that among Bedouin women, the policy change had no effect on fertility.

Model 6 uses the same specification as in Model 2 to test the treatment effect among the Druze women, i.e., we control for the Spouse's (husband's) age. We found that fertility among Druze women who were affected by the treatment increased significantly, by 0.18 births per woman in eight years.

Table 6
Births during the Treatment Period (1994–2001) among Married Bedouin and Druze Women Aged 21–40 (in 1993)—OLS Regressions[a]

	1	2	3	4	5	6	7	8
	All	All	All	Bedouin	Bedouin	Druze	Druze	Druze
Treated group	**0.214**	**0.045**	**0.024**	**0.001**	**0.027**	**0.177**	**0.121**	**0.041**
	(0.03)	**(0.029)**	**(0.027)**	**(0.037)**	**(0.035)**	**(0.043)**	**(0.049)**	**(0.041)**
Bedouin in north	0.692	0.533	0.505	-1.004	-1.032			
	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)			
Bedouin in south	1.914	1.530	1.538					
	(0.05)	(0.04)	(0.04)					
Druze in north	0.483	0.297	0.298			0.320		0.394
	(0.05)	(0.04)	(0.04)			(0.03)		(0.03)
Spouse's age in 1993		-0.297		-0.294		-0.315	-0.173	-0.178
		(0.01)		(0.01)		(0.02)	(0.03)	(0.02)
Spouse's age squared		0.0028		0.0027		0.0031	0.0018	0.0016
		(0.000)		(0.000)		(0.000)	(0.000)	(0.000)
Mother's age in 1993			-0.108		0.012		-0.1811	
			(0.02)		(0.026)		(0.038)	
Mother's age squared (1993)			-0.0007		-0.003		0.0017	
			(0.000)		(0.000)		(0.001)	
Number of children, (in 1993)								-0.478
								(0.02)
Number of childre squared (1993)								0.037
								(0.002)
Additional variables[b]	--	--	--	--	--	--	+	--
Intercept	0.571	7.681	4.760	9.242	4.805	7.847	8.570	6.075
	(0.04)	(0.19)	(0.30)	(0.23)	(0.37)	(0.33)	(0.57)	(0.32)
R squared	0.25	0.44	0.47	0.35	0.39	0.29	0.35	0.35
Observations (N)	15,074	14,039	15,074	8,967	9,959	5,071	4,162	5,071

[a] Values in parentheses are standard errors.

[b] Model 7 includes the following explanatory variables: husband's wages (1993)and four dummy variables, one for each district.

Model 7 also examines the effect of the policy change on Druze women. This model is preferable to Model 6 because it includes not only Spouse's age and Spouse's age-squared but also additional exogenous variables that have a significant effect on fertility: mother's age, mother's age squared, father's income in 1993, and four dummy variables for subdistrict of residence. The inclusion of these variables lowered the estimate of the effect of the treatment on fertility to 0.12 births per woman but left the coefficient significant. The added variables in Model 7 should be included because they had a significant effect on fertility, even though their effect on the probability of the husband's enlisting in the army was not significant. When this model was tested separately for women in the Northern District and in Haifa District, it showed that the effect of the treatment was significant in both districts: coefficients of 0.13 and 0.16 in the respective districts. Model 8 includes two additional explanatory variables beyond father's age and age-squared: number of births up to 1993 (inclusive) and number of births squared. The inclusion of these variables totally masked the effects of the policy change in both districts. Model 8 is not the right model to use for examining the effect of child allowances on fertility because the inclusion of the number of births at early age cause a selection bias. Finally, we should note that even when we confined the sample to women of main fertility age, 20–34 in 1993, the policy change was found to have no effect on Bedouin women and a heightened effect on Druze women, estimated by means of Model 7 at 0.12 births per woman in eight years.

2. Sample of biological sisters

Another way to examine the effects of child allowances on fertility is by testing fertility differences among pairs of biological sisters. One might expect sisters to show strong similarity in their fertility patterns because pairs of sisters are highly similar in a range of socioeconomic traits that affect fertility (parents', schooling, attitude toward religion, social class, preferences, etc.). Practically, below we measure the difference between older sisters and younger sisters in the number of children they have when the younger sisters attain the older sisters' age. The difference between the sisters in number of children reflects several factors: the time trend – due to the long-term downward path of fertility rates in all population groups – differences in the child allowances that the sisters receive, and additional idiosyncratic shocks that may be overlooked because they do not correspond to the probability of receiving child allowances. To neutralize the time trend and isolate the effect of the child allowances, we compared a treatment group composed of pairs of sisters in which the allowances for the younger sisters increased with a control group made up of sisters whose allowance entitlement remained constant.

We define the control groups and the treatment groups differently from the definitions used in the previous sections of this paper. The treatment group includes pairs of sisters whose households do not have army-veteran status. The older sisters in this group did not benefit from enlarged child allowances until 1993, whereas the younger sisters received enlarged allowances in some of these years (from 1993 onward, gradually). Control Group A includes pairs of sisters whose households have army-veteran status; in this group, both sisters received enlarged child allowances throughout their fertility years. Another group is mixed in terms of its army-veteran status – the older sisters are married to veterans and

therefore qualified for enlarged child allowances in all years, whereas the younger sisters are not married to veterans and therefore received enlarged allowances only from 1993 onward. We treat this group as an extra control group (Control Group B) because the differences between its sisters in child allowances acted to the benefit of older sisters (relative to younger sisters) whereas in the treatment group a change occurred that improved the state of younger sisters relative to older sisters (and, therefore, had an upward effect on the relative fertility of the former).

Table 7
Difference in Number of Children between Sisters by Veteran/Non-Veteran Status, Bedouin and Druze Sisters

	Bedouin			Druze		
	Control A	Treatment	Control B	Control A	Treatment	Control B
Children of older sister in 1993 (N)	6.3	6.4	6.5	5.0	4.5	4.4
Children of young sister at the same ag3e (N)	6.1	6.0	6.3	4.6	4.1	4.0
Difference in number of the children between sisters	-0.21	-0.36	-0.14	-0.34	-0.39	-0.45
Age gap between sisters	5.3	5.3	5.6	5.2	4.9	5.2
Observations (N)	95	779	96	761	101	75
Veteran status awarded:	To both of them	To neither	Only to the older	To both of them	To neither	Only to the older

Table 7 presents the fertility patterns among pairs of Bedouin and Druze sisters who were three to nine years apart in age. The comparison of Bedouin women in the treatment group with those in the control group reemphasizes the strong similarity in the fertility levels of the control and the treatment groups. As for the effect of the policy change, the relative fertility of young Bedouin women in the treatment group did not increase; it actually declined relative to that of Control Groups A and B. Therefore, the claim that the increase in child allowances resulted in increased fertility among Bedouin women is refuted again, at least in the first years after the change was made. The result among Druze women was more equivocal: on the one hand, there was a slight and insignificant decrease in the fertility of the young women in the treatment group relative to the main control group (Group A). On the other hand, there was a small and insignificant increase in Control Group B, which strongly resembles the treatment group in its fertility patterns.[2] We should emphasize that the older sisters in Control Group B (in 1992) had much fewer births than the older sisters in Control Group A even though both received enlarged child allowances.

[2] The age discrepancies among women in the treatment group are different from those in the control group; therefore, the time factor has different effects on the groups. We used a regression to neutralize this effect but did not find significant differences between the groups.

This suggests that the high fertility of women who are married to army veterans traces not only to the effect of child allowances and that the fertility patterns of this population group are different from those of non-veterans' wives. Hence, it is preferable to compare the treatment group with Control Group B than with Control Group A. The comparison of the treatment group with Control Group B shows that the fertility of the treatment group increased by 0.06 births in five years. Although this outcome is based on too few observations to be statistically significant, it is compatible with the results of the regression, which showed that the policy change increased the fertility of treated Druze women by 0.12 births per woman in eight years (0.075 in five years).

5. THE EFFECT OF THE CHILD ALLOWANCE ON THE MUSLIM POPULATION BY INCOME

The non-Bedouin Muslim population (hereinafter: the Muslim population) is the largest population that gained from the increase in child allowances in the 1990s. Unlike the Druze and Bedouin populations, a large majority of the Muslim population qualified for the increase in allowances; therefore, we could not identify a control group of Muslim women with which we could test the effect of the increase in allowances on fertility. Although one may use Druze women as a control group for Muslim women, the comparison is obviously problematic because the two groups have somewhat different fertility patterns and are undergoing vastly different social and economic processes.

One possible way of testing the effect of child allowances on the Muslim population rests on the proposition that child allowances have a particularly strong effect on the fertility of poor families. If this premise is correct, we would expect an increase in the allowances to accelerate the fertility of poor women relative to that of more affluent women. To determine whether this really happened, we examined the fertility of women in accordance with husbands' income. We focused on Muslim women aged 20–34 in 1993 who had a long fertility horizon. The spouses of these women were sorted first by age and then by their mean income in 1992–1994. This yielded a group of women whose husbands' income surpassed the median income of the husbands' age group and another group of women whose husbands' income was under the median. The characteristics of these two groups appear in Table 8. There was no meaningful difference between poor and affluent women in terms of age and number of children immediately before the legislative change. It was found that the fertility rate of poor Muslim women in 1994–2001 was higher than that of affluent Muslim women, but this phenomenon was not unique to Muslim women. Much the same was found among Druze women, who did not benefit from an increase in their child allowances and therefore served as a control group. In fact, the differences in fertility between poor and well-to-do women were greater among Druze than among Muslims. Hence, the policy change did not affect the fertility of poor Muslim women differently than they affected well-to-do Muslim women.

Table 8
Number of Births during Treatment Period by Spouse's Wage—Muslims and Druze

	Muslims by spouse's wage		Druze by spouse's wage	
	Below the median	Above the median	Below the median	Above the median
Births 1994-2001 (N)	1.81	1.76	1.55	1.50
Births until 1993 (N)	2.2	2.1	2.1	2.2
Mother's age in 1993	26.4	26.2	26.4	26.4
Spouse's age in 1993	30.1	30.1	30.5	30.5
Spouse's wage 1992–94	1,393	4,004	1,969	5,486
Observations (N)	22,497	22,496	3,471	3,470

Another way to test the effects of the child allowances on the Muslim population is by a sample of sisters. We compared the number of births among the younger sisters with that among the older sisters several years earlier, when they were the younger sisters' age. Since the older Muslim sisters did not benefit from increased child allowances while the younger Muslim sister did enjoy this benefit during some of the treatment period, we would expect the Muslim women's fertility rate to accelerate. In practice, the fertility of the young Muslim women was lower than that of their older sisters, thereby attesting to a downward trend in fertility among Muslim women (Table 9, Columns 1). Comparison of the differences in fertility between the sisters (with the sisters' ages aligned) reflects, apart from the effects of the child allowances, the effect of the time trend, which by dampening the younger sisters' fertility made it necessary to establish a control group. The control group was composed of pairs of Druze sisters who both had army-veteran status and were therefore unaffected by the change in child-allowance policy. Obviously, there is no certainty that the Druze and the Muslims have similar time trends due to important differences between the groups in the social and economic processes that they are undergoing. However, this is the best control group available. To amplify the similarity between the populations, we limited the sample to women from the Northern District, where most of the Druze population and much of the Muslim population live.

Table 9 shows that the decline in fertility was gentler among Muslim sisters in the Northern District than among Druze women in the same district. However, the difference was neither large nor statistically significant and traced partly to differences in the sisters' ages and age spreads. To correct for the age difference between the groups, we compared a pair of Druze sisters with a pair of Muslim sisters only when the sisters' age was the same (Columns 4 and 5). The balanced sample, composed of fewer observations, showed a steeper decline in the fertility of young Muslim sisters who had benefited from an increase in the child allowances. Notably, we limited the sample so as to place the young sisters in the main fertility age cohort (24–35 in 1993) and limited the age gap between the sisters to nine years. On average, the younger sisters benefited from the child-allowance increase for four years.

Table 9
Difference in Number of Children between Sisters, Muslim and Druze Sisters

	1	2	3	4	5
	Muslim sisters in Israel	Muslim sisters in north	Druze sisters in north	Muslim sisters in north	Druze sisters in north
Children of older sister in 1993 (N)	4.6	4.7	4.9	4.9	4.9
Children of younger sister (N)	4.4	4.5	4.6	4.6	4.6
Difference in number of children between sisters	-0.14	-0.19	-0.26	-0.29	-0.26
	(1.7)	(1.7)	(1.8)	(2.1)	(1.8)
Age of older sister in 1993	32.6	32.5	33.1	33.1	33.1
Difference in age between sisters	3.8	3.9	4.1	4.1	4.1
Observations (N)	7,427	3,074	854	851	851

In sum, the comparison of fertility among Muslim sisters before and after the change points to a decline in the fertility of Muslim women after the allowances were increased. A similar decline occurred among Druze sisters in the same geographic region, whose child allowances did not change. Assuming that the Muslim and Druze populations were subjected to similar time trends, one cannot identify any substantive effect of the child-allowance increase on fertility, at least during the first few years of the change.

6. CONCLUSION

This study examined the effect of a hefty increase in child allowances on fertility in Israel. Child allowances for households headed by men who did not serve in the Israel Defence Forces were increased gradually between 1993 and 1997 until they were equalized with those paid to households headed by army veterans. The increase in allowances for fourth children and up was very large, at 30 percent of the per-capita consumption of the relevant population group. Given the large increase in allowances, one would expect to find a clear-cut and meaningful increase in fertility. The results, however, show otherwise.

In regard to the Bedouin population, a poor and traditional one, no effect whatsoever on fertility was found. This finding was unequivocal because the fertility patterns of the treatment group and the control group had been similar before the policy change and remained similar after it. Examining the difference-in-differences, we found no effect on the fertility of Bedouin in the Southern District and of Bedouin in the Northern District. This outcome was supported by a comparison of fertility among biological sisters who were differentiated in their eligibility for child allowances. The effect of the increase in child allowances on the fertility of the Druze population was more meaningful. Before the legislative change, women who received enlarged allowances had higher fertility rates than similar women who did not benefit the same enlarged allowances. After the legislative change, a convergence began: the fertility of the treated women accelerated, as evidenced both in the descriptive statistics and in the regressions that controlled for some of the spouses' characteristics. The effect of the child allowances on Druze women aged 20–39

was estimated by an OLS regression at 0.12 births per woman in eight years. The sample of biological sisters that examined the fertility of women who were affected and unaffected by the policy change relative to their older sisters supports this outcome. It was found that the fertility of treated Druze sisters increased relative to untreated sisters who resemble them (Control Group B) by 0.06 births per woman in five years.

Most women who benefited from the increase in child allowances in the 1990s were Muslim. No appropriate control group could be found for them because the proportion of (non-Bedouin) Muslim men who serve in the army is negligible. Therefore, we had to settle for two indirect tests. The first one found that the fertility of poor Muslim women did not accelerate relative to that of affluent women, even though one would expect the incentive to have a greater effect on the poor population. The second comparison focused on pairs of Muslim and Druze sisters in the Northern District. The comparison of fertility between a pair of Muslim sisters before and after the legislative change indicates that the fertility of Muslim women declined after the allowances were increased (and did not rise, as had been expected). A similar declined occurred among Druze women who dwelled in the same district and whose child allowances did not change. Assuming that the downward trend in Muslim fertility in the Northern District is not stronger than that among Druze women in the same region, one may reject the hypothesis that the child allowances resulted in higher fertility among Muslims.

REFERENCES

Barmby T. and A. Cigno (1990). A Sequential Probability Model of Fertility Patterns, Journal of Population Economics, Vol. 3 (1) pp. 31-35. Springer Berlin Heidelberg.

Becker G. (1991). *A Treatise on the Family*, Harvard University Press.

Becker G. and G. Lewis (1973). On the Interaction Between the Quantity and Quality of Children, *The Journal of Political Economy*, Vol.81, No. 2, Part 2: New Economic Approaches to fertility(Mar-Apr, 1973), pp. S279-S288.

Blanchet D. and O. Ekert-Jaffe (1994). The Demographic Impact of Family Benefits: Evidence from a Micro Model and from Macro Data, in the family, the Market and the State in Ageing Societies, J. Ermisch and N. Ogawa eds., Clarendon Press.

Cigano A.. (1986). Fertility and the Tax-Benefit System: A Reconsideration of the Theory of Family Taxation, *Economic Journal*, 96, 1035-1051.

Ekert-Jaffe. O. (1986). Effect et limites des aides financiers aux families: une experience, un modele, *Population*, 2, 327-348.

Gauthier A. and J. Hatzius (1997). Family Benefits and Fertility: An Economic Model, *Population Studies*, 51, 295-346.

Kreyenfeld Michaela (2001). Timing of first birth in East Germany after reunification, *Vierteljahrsheft zur Wirtschaftsforschung* 70(1): 74-79. 2000.

Meishar Y. and Manski. Charles (2003). Private Incentives and Social Interactions: Fertility Puzzles in Israel, *Journal of The European Economic Association*. March 2003 1(1): 181-211.

Mayshar, Y. and Manski. Charles (2000). Child Allowances and the Birthrate in Israel, Preliminary Results, *Economic Quarterly*, 47, 535-564. (Hebrew).

Sharon E. (1987). The Child Allowance System in Israel: 1959-1987, Its Past and Its Future, *Economic Quarterly*, 38, 202-216 (Hebrew).

Appendix:

Table A.1
Credit Points for the Third Child and Above for Non-Veterans in 1993-2001

	1.1.1993	1.1.1994	1.1.1995	1.1.1996	1.1.1997	1.8.1997*	1.1.2001**
3	1.25	1.45	1.65	1.85	2.00	2.00	2.00
4	1.25	1.85	2.75	3.35	4.05	4.05	4.05
5	1.25	1.75	2.40	2.90	3.40	3.40	5.00
6	1.25	1.80	2.60	2.50	2.25	3.75	5.00
7+	1.25	1.80	2.35	2.25	2.05	3.50	5.00

* The credit points remained constant at these levels from 1.8.1997 to 31.12.2000.

** The credit points remained constant at these levels until 2003.

Table A.2
Child Allowances for Non-Veterans during the Period 1983-2002 in constant prices (New Israeli Shekel, 2002)

	First Child	Second Child	Third Child	Fourth Child	Fifth Child	Sixth Child	Seventh Child and Above
1/8/93	181	181	227	227	227	227	227
1/1/94	181	181	265	337	319	327	327
1/8/94	174	174	251	373	329	313	313
1/1/95	173	173	284	473	413	447	404
1/1/96	172	172	317	575	498	429	388
1/8/96	173	173	321	581	503	400	362
1/1/97	172	172	344	697	585	388	351
1/8/97	174	174	347	703	590	651	607
1/1/98	174	174	348	706	592	653	610
1/1/99	174	174	347	702	590	651	607
1/1/00	173	173	347	703	590	651	607
1/1/01	173	173	348	704	868	868	868
1/1/02	174	174	342	703	868	868	868
1/3/02	148	148	295	599	740	740	740
1/7/02	137	137	272	551	681	681	681

Table A.3
Child Allowances in Selected Developed Countries in 2002 in Euros

Country	First Child	Second Child	Third Child	Fourth Child	Each Additional Child
Israel	43	43	85	175	217
Austria	105	105	105	105	105
Ireland	118	118	147	147	147
UK	108	72	72	72	72
Belgium	71	132	197	197	197
Germany	154	154	154	179	179
Denmark	127	127	127	127	127
Norway	121	121	121	121	121
Spain	24	24	24	24	24
Portugal	87	87	131	131	131
Finland	90	111	131	152	172
France	0	108	139	139	139
Sweden	103	103	103	103	103
Switzerland	111	111	114	114	114

Table A.4
Total Number of Births by Women Aged 40–45 in 1995 by Ethnic Group and MV status

	Bedouins in the South District		Bedouins in the North District		Druze in the North District		Druze in the Haifa District	
	Treated	Un-treated	Treated	Un-treated	Treated	Un-treated	Treated	Un-treated
Number. of births	8.7	8.9	7.6	7.7	5.6	6.9	4.8	5.1
Number of observations	1,124	216	400	255	50	926	16	240
Difference in differences	0.15 (0.7)		0.13 (0.6)		1.25 (3.7)		0.38 (0.9)	

t-values in brackets

Table A.5
Logistic regressions - The probability of a father to be a 'military veteran' according to ethnic group, place of residence and age

	1 Bedouins Living In South District	2 Bedouins Living In North District	3 Druze Living In North District	4 Druze Living In Haifa District
Father age in 1992	**-0.148** **(0.027)**	**-0.025** **(0.006)**	**-0.169** **(0.057)**	**-0.086** **(0.017)**
Father age (in1992) square	0.0015 (0.0004)		0.0024 (0.0007)	
Intercept	5.16 (0.05)	1.56 (0.21)	0.13 (1.07)	1.45 (0.61)
Likelihood Ratio	68.5 (0.001)	15.6 (0.001)	11.5 (0.003)	26.1 (0.001)
Observations	6,393	2,918	4,177	1,103

Figure 1
Fertility rate of Moslem and Druze women in Israel 1960 - 2002