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FINANCIAL INCENTIVES AND FERTILITY

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Abstract—Using panel data on over 300,000 Israeli women from 1999 to 2005, we exploit variation in Israel's child subsidy to identify the impact of changes in the price of a marginal child on fertility. We find a positive, statistically significant, and economically meaningful price effect on overall fertility and, consistent with Becker (1960) and Becker and Tomes (1976), a small effect of income on fertility, which is negative at low and positive at high income levels. We also find a price effect on fertility among older women, suggesting that part of the overall effect is due to a reduction in total fertility.

I. Introduction

THIS paper investigates empirically the effect of financial incentives on fertility decisions. We construct a large, individual-level panel data set using nonpublic data from Israel's Central Bureau of Statistics (ICBS) that matches fertility histories to detailed controls, including education, income, and religious affiliation, for the seven-year period 1999 to 2005. We exploit the substantial changes in child subsidies that occurred during this period to study how financial incentives affect fertility in the population as a whole and within demographic subgroups.

The literature on fertility goes back at least to Thomas Malthus and the nineteenth-century debate on the Poor Law (Boyer, 1989). Malthus argued that the Poor Law subsidized marriage and fertility by removing the natural checks on population growth of delayed marriage and abstention from sexual activity. The key modern reference on fertility as an economic decision is Becker (1960), who argues that children should be analyzed as durable consumption and production goods.[1] Within the Becker framework, demand for children responds to changes in the price of a marginal child. We test this key hypothesis, as well as Becker's conjecture about the limited effect of income changes on fertility.

Whether and to what extent fertility responds to financial incentives is not only of theoretical interest but also has significant policy implications. According to the latest U.N. population estimates, fertility is now below replacement level in 76 countries, accounting for nearly half the world's population.[2] Facing sharp declines in birthrates in recent decades, many developed economies have adopted either explicitly pronatalist policies (France, Germany, Sweden, and the Canadian province of Quebec) or implicit subsidies to children through child care (most Western European countries, the United States, and Canada). At the same time, some developing countries (most notably China) have used financial incentives to discourage fertility.[3]

By merging several nonpublic data sets maintained by the ICBS, we create an individual-level panel data set with 1.2 million person-year observations on fertility. Our data set contains comprehensive information on fertility histories, education, religion, immigrant status, and income for over 300,000 women. During the period we study, there were a number of significant and unanticipated changes in the level of the child subsidy, both increases and decreases, but no changes in eligibility. We use these changes to estimate the effect of the child subsidy a mother would receive for her next child ("the marginal child subsidy") on the probability of becoming pregnant.

In the period we study, the only significant changes in the marginal child subsidy were for third or higher births. Accordingly, we limit our analysis to married women with two or more children and do not attempt to estimate the effect of the child subsidy on the decision not to have children at all or to have a single child. As we discuss in section IIB, the decisions we do study are important for evaluating government policies aimed at affecting overall fertility rates. The percentage of women whose total fertility is two

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[1] This canonical model has been extended in various directions by, for example, introducing family transfers (Cigno, 1986) and social dynamics (see Mayshar & Manski, 2003, who discuss how fertility rates in Israel could decline in the overall population while at the same time increase in the ultra-Orthodox Jewish population).

[2] See, for example, United Nations (2009).

[3] Recent studies of China's policy to discourage fertility include Oster (2005), Ebenstein (2010), and Qian (2008).

or more exceeds 50% in the United States and even in countries where average fertility rates are significantly below the replacement level, such as West Germany and Italy.

Our identification strategy for the effect of the marginal child subsidy is based on the fact that the generosity of the benefit varies over time and differentially by the previous number of children and that these changes were unanticipated (we discuss the policy in greater detail in section II). This implies that, controlling for fertility histories (using a full set of dummies for the number of children, fully interacted with dummies for the age structure of existing children), the effect of the marginal child subsidy can be identified from unanticipated changes over time in the program, within families that have the same number and age structure of children. We control for confounding time effects with year fixed effects (and in some specifications year × religious group, year × income group, and year × religious group × income group dummies). We also control for household income, education, religious and ethnic group, and immigrant status.

We find that a NIS 150 (about US$34) reduction in the monthly benefit for a marginal child, roughly equal to 2% of average income and 3.3% of median income in our sample, reduces the probability of an incremental child for mothers with at least two children by 0.99 percentage points per annum in our preferred specification.[4] This implies that a 1% increase in the price of raising a marginal child (which includes estimates of the annual financial cost and of forgone income from raising a child, less the benefit) leads to a 0.496% increase in the probability of a woman becoming pregnant in a given year. We also estimate a benefit elasticity: a 1% increase in the child subsidy leads to a 0.176% increase in the probability of a woman becoming pregnant in a given year. The effect of the marginal child subsidy on fertility is weakest among households at the upper end of the income distribution. The effect is strongest among Arab Muslims and weakest in the ultra-Orthodox Jewish population, for whom the effect is positive but small in magnitude and statistically significant only in some specifications. We also find an effect among women who are nearing the end of their lifetime fertility and are unlikely to postpone fertility (those aged greater than 35 and less than or equal to 40 or greater than 40 and less than 45).

Although it is not the primary focus of this paper, we also estimate the effect of income on fertility. This raises concerns of omitted variable bias and simultaneity. We address omitted variable bias by controlling for a wide range of observables and also present results using a mother fixed-effects specification. To deal with simultaneity, we control for household income in the year prior to the birth of the marginal child, and we also instrument for household income using the husband's income two years prior to the birth of the marginal child (as husbands are less likely than mothers to adjust labor supply two years prior to the birth of the next child). While these strategies are plausible, we acknowledge that they lack the clean identification of our child subsidy results. Nonetheless, the results are interesting and consistent with the theoretical predictions that Becker (1960) and Becker and Tomes (1976) outlined. We find that the effect of income on fertility is small and that this effect is negative at low levels of income and positive at higher income levels. These results are robust to controlling for a mother fixed effect or instrumenting for household income.

Our paper adds to a significant empirical literature on financial incentives and fertility. While cross-country studies have found mixed, weak, or insignificant effects of child subsidies on fertility, two recent studies using individual data have also identified positive and significant effects.[5] Milligan (2005), using Canadian data, finds that the introduction of a child tax subsidy in the 1990s had a significant and positive effect on fertility. Laroque and Salanié (2008), using French data and variation in the French tax code, conclude that tax incentives affect fertility decisions in France.[6] There is also a literature that examines the effect on fertility of U.S. tax provisions and social policies benefiting families with children (Blau & Robbins 1989; Whittington, 1992; Acs, 1996; Fairlee & London, 1997; Moffitt, 1998, 2000; Grogger, Karoly, & Klerman, 2002; Dyer & Fairlee, 2003; Rosenzweig, 1999; Joyce, Kaestner, & Korenman, 2003; Kearny, 2004). Overall, this literature finds no effects or modest effects.[7]

While the negative correlation between income and fertility has been consistently documented (see Becker, 1960; Borg, 1989; Docquier, 2004; and Jones, Schoonbroodt, & Tertilt 2008), it has been recognized (since Becker, 1960) that these results are plagued by omitted variable bias.[8] One approach adopted in the literature is to use the husband's income (Hotz & Miller, 1988; Milligan, 2005; Jones & Tertilt, 2008), but this could also be jointly determined with a woman's fertility. Black et al. (2008) use shocks to coal prices to instrument for county-level income in coal-producing regions but do not identify the price effect. In a well-known early paper, Schultz (1985) uses agricultural commodity prices to instrument for both women's and men's wages.

Our study contributes to the literature in several ways. First, the longitudinal nature and richness of our data set enables us to identify (by back timing conception from the exact date of birth) the approximate date at which fertility decisions are made, as well as to control for a detailed set of covariates at the time of conception. In addition, we use

[4] We use 2007 NIS throughout. During the period of our study, the average exchange rate was 4.4 NIS to US$.

[5] See, for example, Demeny (1986), who reviews the mixed evidence on pro-fertility policies in France, Romania, Germany, and Hungary; Gauthier and Hatzius (1997), who provide cross-country evidence from 22 OECD countries; and Dunn (2003).

[6] In addition, Schellekens (2006) examines data from the period 1983 to 1995 in Israel and seeks to estimate the effect of the child subsidy on the hazard rate of childbirth. The length of the period examined makes it difficult for this study to disentangle the effect of child subsidies from that of long-run fertility trends.

[7] More recently, Lalive and Zweimuller (2009) find significant effects of parental leave policies in Austria.

[8] An extensive literature examines the causal relationship in the other direction—from fertility to mother's labor supply (see, for example, Angrist & Evans, 1998).

TABLE 1.—MONTHLY CHILD SUBSIDY BY BIRTH ORDER AND YEAR OF BIRTH (2007 NIS)

Year	1999	2000	2001	2002	2003		2004		2005	
Birth Order among Children under Age 18					Children Born in 2003	Children Born before 2003	Children Born in 2003 or later	Children Born before 2003	Children Born in 2003 or later	Children Born before 2003
1	190	191	188	159	150	150	127	127	123	123
2	190	191	188	159	150	150	127	127	123	123
3	381	381	378	316	150	259	127	176	123	160
4	770	772	765	640	150	550	127	436	123	369
5	647	648	943	790	150	663	127	500	123	412
6 or more	713	715	943	790	150	663	127	500	123	412

detailed information on the ages of a woman's existing children to calculate the effect of policy changes on the present value of the stream of subsidy payments that she can expect for a marginal child and her existing children.

Second, we are able to investigate how the effect of incentives on fertility varies across ethnic, religious, and income subgroups. It has been suggested that the effect of financial incentives on fertility is likely to vary with both economic development (see Schultz, 1985, and Jones & Tertilt, 2008, for useful surveys) and cultural norms (Fernandez & Fogli, 2009). Israel provides a good setting for studying the effect within population groups that vary considerably by income, degree of religiosity, religion, and social and cultural norms.

Third, access to panel data allows us to lag household or husband's income one or two years prior to the birth of the marginal child and control for mother fixed effects, neither of which is possible when using cross-sectional data. Although controlling for mother fixed effects changes the interpretation of the coefficients (as we discuss), it allows us to control for a wide range of time-invariant unobservables such as target fertility and permanent income.

The remainder of the paper is organized as follows. Section II describes our data set and the child subsidy program in Israel. Section III discusses our identification strategy and specifications. Section IV presents our results. Section V discusses the magnitude of effects, and section VI concludes.

II. Institutional Background and Data

A. *The Child Subsidies Program in Israel*

The child subsidy is a nontaxable payment to all mothers of children under the age of 18, with the amount of the payment a function of the number of children less than age 18 (see table 1). The child subsidy is one of Israel's most important welfare expenditures. In 2004, 947,000 mothers received child subsidies, paid to support approximately 2.2 million children. Child subsidy outlays in 2004 were NIS 4.6 billion. During the period we study, total child subsidy expenditures ranged from 0.8% to 1.5% of Israel's GDP, peaking in 2000 and declining significantly after the 2003 reform that we describe below.[9]

Israel introduced the child subsidy in 1959 and has revised its coverage (age, family size, veteran status) and generosity many times since then.[10] The period we study (1999 to 2005) includes significant variation in the level of child subsidies but not in eligibility and coverage. In general, the child subsidy has tended to increase over time, although in the period we study, there were a number of unanticipated policy changes, induced by shifts in Israel's coalition politics, that magnified or negated this trend.

The Halpert Law, which was implemented in January 2001, increased the benefit for fifth and higher-order births by 33% to 47% and was in place for less than a year and a half. When it was repealed, the child subsidy for fifth and higher-order births returned to their levels prior to the reform.

The so-called Netanyahu reform in June 2003 significantly reduced benefits so that children born after June 2003 receive a subsidy equivalent to that of the first two children in the family regardless of the number of previous children. For example, whereas in 2002, having an extra child would have provided a family with three children an additional NIS 640 per month (approximately U.S.$160 or about 9% of the average household income in Israel at that time), it would have provided only NIS 150 (approximately U.S.$34) per month after June 2003. The subsidy for children born before 2003 was stipulated to decline gradually over a six-year transition period until it was equal to the subsidy for a marginal child. Although child subsidies were reduced across the board, given the pre-2003 nonlinearity in the subsidy, the biggest reduction in benefits after 2003 was for large families.

Table 1 summarizes the child subsidy for newborn and existing children. The child subsidy varies by year and birth order for newborns and by year, year of birth, and birth order for existing children (children are not locked into the child subsidy that prevailed when they were born). Prior to 2003, the benefit depended on only the child's birth order among children under age 18, with the benefit increasing nonlinearly with birth order. From 2003 onward, the benefit differs between children born before 2003 and those born in 2003 or later. In particular, from June 2003 onward, new-

[9] For a review of the child subsidy system and a wealth of descriptive statistics about it, see Frish (2004).

[10] The program originally covered children under age 14, which was extended to age 18 in 1965. Coverage was initially limited to families with four or more children but was extended in 1972 to families with three or more children and in 1975 (in the so-called Ben-Shahar Reform) to all children under age 18. In the 1990s, child subsidies for the first (and eventually second) child of families with three or fewer children were revoked but eventually reinstated. Another feature of the program that has varied is eligibility based on military veteran status, which was required until the mid-1990s but not afterward.

borns receive the same child subsidy regardless of birth order, whereas the benefit for children born before 2003 continues to differ by birth order.

A natural concern in exploiting changes in child subsidy levels is that other government programs may have changed concurrently. However, changes in the child subsidy were unanticipated and largely driven by changes in the power that religious parties, which strongly support child subsidies, wielded in the complex coalition politics of Israel. In 2001, the Halpert Law focused on the child subsidy and was not accompanied by any other changes in government programs. The 2003 revision of child subsidies was accompanied by other fiscal reforms, but these reforms did not have a significant impact on married families with children.[11]

B. *The Affected Israeli Population*

Women with two or more children. During the period we study, significant changes in the marginal child subsidy occurred only for third and higher-order births, and we accordingly focus on the choice of whether to have more than two children. This is a choice that a large majority of women in Israel face during their fertile years. According to ICBS data, among women in Israel between ages 46 and 50, a group for which actual fertility rates approximate total fertility rates, about 76% have two or more children.

More generally, the choice whether to have more than two children is relevant for a majority of women in most developed countries. In the United States in 2008, among women ages 40 to 44, 63% of all women and 69% of ever-married women had two or more children. In European countries, among women born in 1965, the percentage of women who had two or more children was 72% in Sweden, 71% in France, 70% in England and Wales, 65% in the Netherlands, 61% in Spain, 57% in West Germany, and 51% in Italy. Of course, countries with relatively low fertility rates, such as Italy (with a fertility rate of 1.51), have a large percentage of women with total fertility of 0 or 1 child, whereas countries with relatively high fertility rates such as Israel (with a fertility rate of 2.7) have a relatively low percentage of such women. But women with total fertility of two or more children comprise a large fraction of the female population in all developed countries, and understanding the extent to which decisions to move beyond two children are sensitive to financial incentives is thus important for evaluating the overall effect of government policies on fertility.[12]

Subgroups. The Israeli population has significant heterogeneity in social norms concerning fertility across religious and economic groups. This allows us to use our data and research design to analyze the effect of financial incentives on fertility within very different economic and cultural settings.

About 75% of the Israeli population is Jewish, and 17% is Arab Muslim. The Jewish population can be divided into three groups: the secular, Orthodox, and ultra-Orthodox populations. The secular Jewish population has high education levels and high female labor force participation and is similar in these respects to most of the population in OECD countries. The Orthodox Jewish population also has high education levels and high female labor force participation, but a higher fertility rate than the secular population. In contrast, the ultra-Orthodox and Arab Muslim populations are characterized by a low level of education, low female labor force participation, and social norms that strongly encourage fertility (with completed fertility averaging 6.4 and 5.34, respectively, in our sample). The Arab Muslim population is similar to some populations in developing countries, especially in the Middle East, and to some minorities in OECD countries.

While the heterogeneity of the Israeli population allows a wide range of plausible comparisons with developing and developed countries, caution must be used in extrapolating our results to other contexts.

C. *The Data*

We use nonpublic individual-level panel data sets maintained by Israel's ICBS, to which the ICBS allows restricted access. We merge several data sets to create a comprehensive data set that includes fertility histories, basic demographic characteristics, education, religious affiliation, ethnicity, and household income. Appendix A describes the process we follow and the information available for individuals in our data set. Appendix B provides a list and the definitions of all the variables used in our regressions.

Because changes in child subsidies were limited to third or higher births, we include in our data set only women with two or more children. We also do not include unmarried women, who comprise 16% of women with two or more children, because from this group, 76% are divorced and 20% are widowed and the ICBS does not have data on alimony payments, pensions, and death benefits. The ICBS also has relatively poor information about the identity of the spouse and household income for the small proportion that is cohabitating as unregistered couples.

Overall, our data contain information on a 40% random sample of all women in Israel who were married, under age 45, and had at least two children during the period 1999 to 2005. (Since women enter the sample when they have two or more children and exit when they turn 45, it is not a balanced panel.[13]) Altogether, we have data on about 1.2 million woman-year observations that account for about 300,000 women.

[11] The Netanyahu reforms also included cuts in unemployment benefits and income-maintenance benefits, but very few families in our research sample would have been affected by these changes.

[12] Data noted in this paragraph for the United States are from the U.S. Census Bureau, for Israel from the ICBS, for European countries other than Germany from Frejka (2008), and for West Germany from Köppen (2006).

[13] The sample excludes Arab Christians and other small minorities, which account for less than 5% of the sample.

III. Theoretical and Empirical Framework

A. Theoretical Framework

We examine fertility decision within the static Becker (1960) framework. Children are viewed as durable consumer goods, and there is demand for children along with other commodities. We examine two types of effects. (See Hotz, Klerman, & Willis, 1997, for a more detailed discussion of fertility models.) First, reductions in the child subsidy decrease the subsidy for the marginal child and, in turn, increase the net-of-subsidy price of the marginal child. We would expect the price effect to reduce the demand for children, both because children are probably normal goods and any income effect from the marginal child subsidy is likely to be small. To examine the price effect, our key right-hand-side variable is the child subsidy that would be paid for the next (marginal) child, which is inversely related to the price of a marginal child.

Second, we examine the effect of income on fertility. In particular, we examine Becker's (1960) hypothesis that income effects on fertility are likely to be small, in part because of his conjecture that households respond to fertility along both quantity and quality dimensions. The standard presumption in the literature is that children are normal goods, although Becker (1960) notes that this is not an implication of the model and subsequent authors have conjectured that the income elasticity of fertility may vary with income (Becker & Tomes, 1976) and the level of development (Galor & Weil, 1999).[14]

Due to the six-year window of our data, we are unable to examine some interesting aspects of fertility dynamics and lifetime fertility such as age at first birth, the spacing of births, and completed fertility (Heckman, Hotz, and Walker, 1985; Heckman & Walker, 1990; Pettersson-Lidbom & Skogman Thoursie, 2009). However, we are able to provide some indirect evidence regarding timing effects**.** First, we can split the results by mother's age; women aged 35 and older are unlikely to be able to postpone fertility, so for this group, any observed reduction in fertility is likely to correspond to a reduction in completed fertility. Second, our fixed-effects results control for time-invariant (permanent) income and the average price of children at the household level (again most plausibly for older mothers for whom we observe midcareer income), and thus identify the response to deviations from average prices and income; if the magnitude of these effects is greater than our OLS results, it will suggest households could be timing their responses to exploit year-to-year changes.

B. Empirical Strategy

Our empirical strategy is based on examining the fertility decision for a marginal child. Thus, we time births to the month of conception (estimated as nine months prior to the birth of a child) and use an indicator for having become pregnant in that year as the outcome.[15]

Our key right-hand-side variable is the present value of the subsidy a woman would expect to receive for her next child. This varies by the number of prior children younger than age 18 and year (as indicated in table 1) and by the age distribution of previous children under age 18. The age distribution of previous children under age 18 determines how long a mother will expect to receive a given level of child subsidy. For example, a fourth child preceded by three children aged 1, 2, and 3 would receive the fourth-child subsidy (NIS 369 per month in 2005) for the next fifteen years, but a fourth child preceded by three children aged 16, 17, and 18 would receive the fourth-child subsidy for only one year and within three years would transition to receiving the first-child subsidy (NIS 123) for the next fifteen years.

The present-value calculation is forward looking in the sense that it correctly accounts for previous children aging out of the subsidy (turning age 18) and future changes in the child subsidy schedule that have been announced under the current rules.[16] Examining the evolution of the child subsidy (figure 1), we see that prior to 2001, the subsidy had been gradually increasing over time for higher-order births and relatively flat for first and second births. In this context, the considerable increase produced by the Halpert Law was probably greater than expected, and the subsequent drastic decrease produced by the Netanyahu reform was also greater than expected. In section IVG, we present results under three alternative models of expectation formation.

We also examine the effect of household income, which is defined as the husband's and wife's labor income plus the current subsidies that a household will receive for its existing (inframarginal) children. By controlling for income, we are able to identify the price effect of a change in the marginal child subsidy and obtain an estimate of the effect of household income on fertility (although this raises issues of omitted variable bias and simultaneity, which we address below).

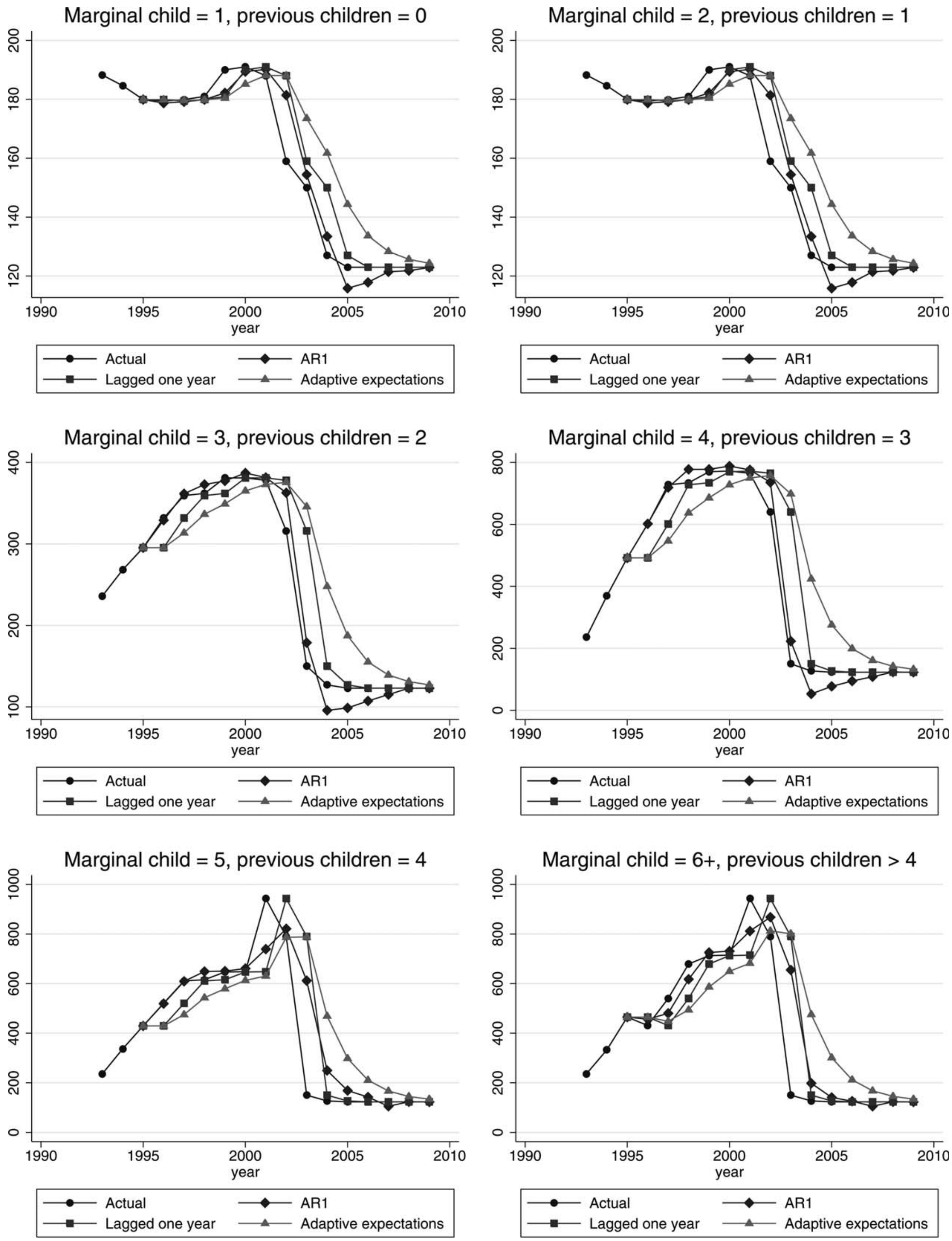
Our identification strategy is to control for the number and age structure of existing children, which we do using a nonparametric specification: a full set of dummies for the previous number of children, a full set of dummies for indi-

[14] An issue that we do not examine, as we do not have the data necessary to do so, is the trade-off between the quality and quantity of children. Work focusing on this issue includes papers by Angrist, Lavy, and Schlosser (2006) and Black, Devereux, and Salvanes (2007).

[15] An issue with using live births to determine pregnancies is that we miss aborted or miscarried births. Abortions, although legal, are much less common in Israel than, for example, the United States, with one abortion to every eight live births in Israel compared to a 1:4 ratio in the United States (see ICBS, 2010, tables 3.20 and 3.21). But more precisely, the outcome should be thought of as the probability of pregnancy for an eventually-live birth.

[16] The child subsidy reform in 2003 announced a benefit schedule for current and future children until 2009, which we assume remains in place thereafter. Our calculation of the present value of the marginal child subsidy uses a discount rate of 5% and assumes that all live births survive to age 18. By ignoring infant mortality, we somewhat overstate the present value of the child subsidy. However, infant mortality rates in Israel, including those for the Arab Muslim population, are fairly low, even by OECD country standards.

FIGURE 1.—COMPARING ACTUAL AND EXPECTED CHILD SUBSIDIES



cators of the age distribution of previous children, and a full set of interactions between these two sets of dummies. Within each number × age distribution of children cell, households face the same child subsidy for their next child, and the child subsidy effect is then identified from unanticipated, exogenous between-year policy changes.

Our strategy also requires us to control for potentially confounding time effects. Because the child subsidy varies differentially by the number of existing children across years, we are able to control for year fixed effects (and eventually income group × religious group × year fixed effects, when we split the sample).[17]

Thus, our specification is a linear probability model of the form:

$$\begin{aligned} Pregnant_{it} = {} & \alpha + Child\ subsidy_{it}\delta \\ & + \log Household\ income_{it}\gamma + \\ & + \sum_j \sum_k \sum_m 1(\#kids_{it} = j)\cdot \\ & 1(\#kids\ in\ age\ range_{it}\ k = m)\beta_{jkm} \\ & + X_{it}\varphi + \rho_r + \tau_t + \varepsilon_{it}, \end{aligned} \tag{1}$$

where $Pregnant_{it}$ is equal to 1 if mother i was pregnant in year t. The triple sum represents a full set of dummies for the number of previous children, $1(\#kids_{it} = j)$, for j=1,. . .,10, where $1(\cdot)$ is the indicator function; a full set of dummies for the number of children m a woman has in age range k at the beginning of year t, $1(\#kids\ in\ age\ range_{it}\ k = m)$, where k=1, . . . , 4, for four age ranges (between 0 and 4, between 5 and 13, between 14 and 17, and above 18) and m index the number of children; and the interactions of these dummies. X_{it} includes other controls such as education, ρ_r are religious group dummies, and τ_t are year dummies.[18] We cluster standard errors in year × number of children × age distribution of children cells, which is the level of variation of the child subsidy.[19]

As noted earlier, controlling for income raises concerns about omitted variable bias and simultaneity. To address omitted variable bias (income could be correlated with household-level unobservables, even after controlling for education, religious affiliation, and immigrant status), we estimate a mother fixed-effects specification:

$$\begin{aligned} Pregnant_{it} = {} & \alpha_i + Child\ subsidy_{it}\delta \\ & + \log Household\ income_{it}\gamma + \\ & + \sum_j \sum_k \sum_m 1(\#kids_{it} = j)\cdot \\ & 1(\#kids\ in\ age\ range_{it}\ k = m)\beta_{jkm} \\ & + X_{it}\varphi + \tau_t + \varepsilon_{it}. \end{aligned} \tag{2}$$

Mother fixed effects, α_i, alter the interpretation of the results in two ways. First, they cleanse the specification of any bias that might remain due to time-invariant unobserved heterogeneity in factors that influence fertility and labor decisions. Second, we are identifying the response of fertility to deviations of the child subsidy and income from their averages. For households with a stable income (for example, mothers in their 30s and 40s), this could be interpreted as identifying the effect of transitory deviations in income from permanent income. For the child subsidy, the interpretation is trickier, since the subsidy was changing throughout the period, but if households are responding to a greater extent to deviations from the average subsidy than year-to-year changes, we would expect the fixed-effect estimates to be larger than the OLS estimates.

To mitigate simultaneity (household income, and especially the mother's income, could be determined jointly with fertility), we control for household income in the year prior to the birth of the marginal child. Nonetheless, it is possible that households anticipate future births by more than nine months in making work decisions, especially for the mother.[20] Thus, we also instrument for household income using husband's income lagged two years prior to the birth of the marginal child. Husband's lagged income is a valid instrument under the assumption that it is not simultaneously determined with fertility. We believe that this is a plausible assumption because husbands are less likely to adjust their work in response to anticipated fertility than mothers, especially two years prior to the birth of the next child.

We present results for the full sample and split the sample by religious group, income group, religious group × income group, and the mother's age group. When splitting the results by religious group, we include controls for immigrant status for the Jewish population.

IV. Results

A. *Summary Statistics*

Table 2 presents summary statistics for our sample. The main sample consists of approximately 1.2 million person-year observations. Of these, 54% are secular Jewish, 14% are Orthodox, 12% are ultra-Orthodox, and 20% are Arab Muslim. Table 2 indicates that the mean number of children per woman is 3.4, which is higher than the average level of fertility among Israeli women (2.7 children in 2005) because our sample consists of married women with two or more children (note also that this is fertility as observed in our sample, not completed fertility). The mean number of children varies by income group and religious group: fertility declines from an average of 3.93 children among below-poverty-line mothers to 2.97 in the top decile of income and ranges from 2.68 in the secular Jewish population to 4.76 and 4.23 in the ultra-Orthodox Jewish and Arab Muslim populations.

The mother's average age in the sample is 35. Average annual household net income is approximately NIS 113,000

[17] For example, year fixed effects absorb events such as macroeconomic shocks, and religious group × year fixed effects absorb the differential impact of the Intifada by year and religious group.

[18] Using a probit provides similar results.

[19] This gives 1,686 clusters. Our results are similar for other plausible clustering schemes.

[20] Since our data are annualized, for children born after September, our income measure includes up to three months of postbirth income. Israeli women who worked for at least twelve months before giving birth receive maternity leave payments during this three-month period, which are included in our data.

Table 2.—Summary Statistics

	Full Sample	Below Poverty Income	Above Poverty Income and Below 90%	Top 10%	Secular Jewish	Orthodox Jewish	Ultra-Orthodox Jewish	Arab Muslims
Number of children	3.40	3.93	3.07	2.97	2.68	3.49	4.76	4.23
	(1.69)	(1.99)	(1.4)	(1.16)	(0.85)	(1.4)	(2.45)	(1.91)
Propability of getting pregnant	0.103	0.139	0.087	0.064	0.054	0.111	0.242	0.143
	(0.32)	(0.36)	(0.29)	(0.25)	(0.22)	(0.32)	(0.44)	(0.37)
Marginal child subsidy	389.24	396.60	385.76	378.54	357.17	409.23	428.36	430.69
	(273.56)	(290.18)	(261.84)	(264.12)	(241.38)	(286.5)	(308.62)	(304.41)
Husband's age	38.45	37.56	38.62	40.97	39.49	38.90	35.87	37.21
	(6.32)	(7.03)	(5.82)	(4.88)	(5.6)	(6.4)	(6.85)	(6.88)
Mother age at first birth	23.70	22.64	24.03	26.09	24.77	23.63	22.56	21.88
	(3.78)	(3.69)	(3.64)	(3.34)	(3.76)	(3.53)	(3.07)	(3.44)
Months from last birth	56.85	49.92	60.18	66.68	67.95	53.11	33.88	46.25
	(44.02)	(42.42)	(44.53)	(43.66)	(−45.99)	(−40.47)	(32.18)	(38.76)
Husband working	0.75	0.44	0.94	1.00	0.81	0.81	0.51	0.70
	(0.43)	(0.5)	(0.24)	(0.05)	(0.39)	(0.39)	(0.5)	(0.46)
Maximum education	2.60	2.20	2.70	3.44	2.89	2.76	2.08	2.03
	(0.91)	(0.81)	(0.87)	(0.73)	(0.87)	(0.93)	(0.35)	(0.84)
Reference fertility	3.17	3.51	2.99	2.81	2.49	3.25	4.34	4.08
	(1.31)	(1.51)	(1.16)	(0.79)	(0.55)	(0.93)	(1.71)	(1.45)
Number of children ages 0–4	0.99	1.22	0.87	0.69	0.68	1.00	1.71	1.28
	(0.96)	(1.06)	(0.87)	(0.76)	(0.76)	(0.9)	(1.07)	(1.02)
Number of children ages 5–13	1.56	1.76	1.42	1.46	1.28	1.60	2.07	1.88
	(1.15)	(1.33)	(1.02)	(0.91)	(0.83)	(1.07)	(1.58)	(1.34)
Number of children ages 14–17	0.61	0.66	0.57	0.64	0.56	0.63	0.69	0.70
	(0.88)	(0.97)	(0.82)	(0.81)	(0.75)	(0.86)	(1.08)	(1.04)
Number of children above age 18	0.24	0.29	0.21	0.18	0.17	0.26	0.29	0.37
	(0.69)	(0.81)	(0.61)	(0.5)	(0.48)	(0.65)	(0.8)	(0.97)
Household income	113,211	32,482	129,558	336,642	143,313	122,002	74,492	58,426
	(307,528)	(23,604)	(43,345)	(905,608)	(402,953)	(224,449)	(105,782)	(49,210)
Husband's income	64,161	12,292	74,235	209,798	83,354	68,723	31,498	34,724
	(269,806)	(17,732)	(38,632)	(811,118)	(357,358)	(181,570)	(90,528)	(38,036)
Sample size	1,240,824	454,463	646,665	139,696	670,582	171,115	148,252	244,829
As % of full population	100%	37%	52%	11%	54%	14%	12%	20%

Summary statistics are for a 40% random sample of women less than age 45 who were married and had at least two children when they entered the panel. Standard deviations in parentheses.

(approximately U.S.$25,000). Notably, net household income is much higher for the secular Jewish and Orthodox Jewish populations and much lower for both the ultra-Orthodox and Arab Muslims. This is partly due to low participation rates of ultra-Orthodox men and Arab women in the labor force (55% and 21%, respectively). The marginal child subsidy accounts for 4.13% of average net household income over the research period.

B. *Baseline Specification*

Table 3 presents several versions of our baseline specification. In column 1, we control for income using indicator variables for whether the husband is working and for middle-income and high-income households. This is a reasonable starting point, because these indicators are unlikely to be simultaneously determined with fertility. In contrast, in column 2, we control for log net household income. Whereas in columns 1 and 2 we control for the mother's fertility history using parametric controls in the number of previous children, age at first birth, and months since last birth, in column 3, we use a fully interacted set of dummies for the number and age distribution of children.

In columns 1 and 2, we find nearly identical and positive effects of the child subsidy on the probability of pregnancy, suggesting that the child subsidy coefficient is not sensitive to how we control for household income. In column 3, we continue to find a positive effect, statistically significant at the 1% level. The importance of flexibly controlling for the mother's fertility history is underlined by the fact that the magnitude of the coefficient is more than halved in column 3 compared to columns 1 and 2. We will therefore use this specification in subsequent tables.

Since the scaling of the child subsidy coefficient is not intuitive, in subsequent tables we consider the effect of a NIS 150 (approximately U.S.$34) monthly increase in child subsidy (typical of variation in the subsidy in our sample), which we convert into a probability (multiplying by 100). For instance, a coefficient of 0.000066 is multiplied by 150 and by 100, yielding a 0.99 percentage point increase in the probability of pregnancy from a NIS 150 increase in child subsidy. This should be compared to the baseline probability of pregnancy of 10.3%.

In contrast to the uniformly positive effect of the child subsidy, we find that the sign of the coefficient of log net household income varies depending on the specification. In column 1, we find a positive effect of being in the top income decile and a negative effect of the husband working. In columns 2 and 3, we find instead a negative effect of log net household income on fertility. In subsequent tables, when we split the results by income, we will see that both of these effects are in fact present: a positive effect of

TABLE 3.—AVERAGE EFFECT OF CHILD ALLOWANCE ON THE PROBABILITY OF PREGNANCY

	Parametric Fertility Controls (1)	Parametric Fertility Controls (2)	Nonparametric Fertility Controls (3)
Child subsidy	0.000166***	0.000167***	0.000066***
	(0.000017)	(0.000017)	(0.000010)
Maximum education	−0.028129***	−0.027262***	−0.012855***
	(0.001014)	(0.001031)	(0.000768)
Orthodox Jewish	0.124842***	0.124220***	0.083902***
	(0.003657)	(0.003628)	(0.001843)
Ultra-Orthodox Jewish	0.352940***	0.353609***	0.224517***
	(0.008410)	(0.008234)	(0.003950)
Muslim Arabs	0.231550***	0.229838***	0.143454***
	(0.005561)	(0.005399)	(0.003112)
Reference fertility	−0.097791***	−0.097842***	−0.048450***
	(0.003624)	(0.003588)	(0.001564)
Age at first birth	0.007900***	0.008037***	
	(0.000519)	(0.000524)	
Months from last birth	0.001582***	0.001594***	
	(0.000229)	(0.000229)	
Months from last birth^2	−0.000008***	−0.000008***	
	(0.000001)	(0.000001)	
Number of children	0.022980***	0.023430***	
	(0.001459)	(0.001458)	
Husband working	−0.011423***		
	(0.001157)		
Income dummy (above poverty and below the 90th percentile)	0.002708*		
	(0.001493)		
Income dummy (above the 90th percentile)	0.009003***		
	(0.003196)		
Log (net household income)		−0.001645	−0.000617
		(0.001018)	(0.001026)
Year dummies	Yes	Yes	Yes
Mean probability of pregnancy × 100	10.3	10.3	10.3
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	2.49***	2.50***	0.99***
	(0.26)	(0.26)	(0.14)
Log net household income × 100		−0.16	−0.06
		(0.10)	(0.10)
Observations	1,233,263	1,233,263	1,233,342
Adjusted R^2	0.095	0.095	0.102

Linear probability models are estimated. Column 3 controls for the number and age distribution of children with number-of-children fixed effects; a full set of indicators for the number of children in the age ranges (0,4), (5,13), (14,17), and 18 and older; and full interactions of these two. Standard errors are in parentheses. Standard errors are clustered by year × number and age of children. Statistically signifant at ***0.01, **0.05, and *0.10.

income on fertility in the top income decile and a negative income effect at lower income levels. As noted in section IIIB, controlling for income raises the issue of simultaneity bias, which we examine in section IVF.

The signs and magnitudes of the other coefficients are in general robust and in the expected direction. Fertility is decreasing in education and is significantly higher in the Orthodox Jewish, ultra-Orthodox Jewish, and Arab Muslim populations compared to the secular Jewish population, ceteris paribus.

C. *Effect by Income Category and by Religious Group*

In this section, we consider the effect of the child subsidy within subgroups defined by income, religion, and income × religion. These results are of interest for several reasons. Splitting the sample by income category provides a useful plausibility check of our results. Since the marginal child subsidy constitutes a smaller percentage of household income at the upper, compared to the lower, end of the income distribution, we would expect the child subsidy effect to decrease with income. Splitting the sample by religious affiliation creates groups that are more internally homogeneous in terms of fertility, education, and labor market participation, and provides an interesting window on the between-group heterogeneity of the child subsidy effect. Subsamples also free up the year fixed effect, allowing us to control for religious group, income group, or religious group × income group – specific time-varying unobservables.

We split the results by income category in table 4 and find that the effect of the marginal child subsidy is positive and statistically significant for all income categories. A NIS 150 monthly increase in the present value of the marginal child subsidy leads to a 1.05 percentage point increase in the probability of pregnancy in the below-poverty income group compared to a baseline probability of 13.9%. As expected, the magnitude of the child subsidy effect decreases with income. The effect is 0.85 and 0.74 percentage points for the middle- and upper-income categories but remains significant at the 1% level.[21]

[21] While it is somewhat surprising that the child subsidy effect does not decline more significantly with income, it is worth noting that the 90th percentile of net household income is approximately US$30,000, so even for this group, the subsidy is potentially quite large.

Table 4.—Effect of the Present Value of Child Allowance by Income Category and Religious Group, Nonparametric Fertility Controls

	Full Sample (1)	Below Poverty Income (2)	Above Poverty Income and Below 90% (3)	Top 10% (4)	Secular Jewish (5)	Orthodox Jewish (6)	Ultra-Orthodox Jewish (7)	Muslim Arabs (8)
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	0.99***	1.05***	0.85***	0.74**	0.87***	0.99***	0.34	1.73***
	(0.14)	(0.12)	(0.18)	(0.31)	(0.25)	(0.25)	(0.22)	(0.23)
Log net household income × 100	−0.06	−1.04***	0.15	0.55***	0.11*	−0.03	−1.23***	−0.96***
	(0.10)	(0.12)	(0.33)	(0.19)	(0.06)	(0.12)	(0.16)	(0.12)
Mean probability of pregnancy × 100	10.3	13.92	8.66	6.41	5.4	11.1	24.2	14.3
Observations	1,233,342	451,341	643,036	138,965	666,083	170,120	147,653	243,475
Adjusted R^2	0.102	0.121	0.077	0.051	0.028	0.053	0.095	0.077

Linear probability models are presented. We control for the number and age distribution of children with number-of-children fixed effects; a full set of indicators for the number of children in the age ranges (0,4), (5,13), (14,17), and 18 and older; and full interactions of these two. We control for year effects using year dummies. Additional controls include reference fertility; education controls; and, where relevant, religious and ethnic group indicators. Standard errors are in parentheses. Standard errors are clustered in year × number of children × age distribution of children cells. Statistically significant at *0.01, **0.05, and ***0.10.

The income effect varies across income categories. It is negative, albeit small in magnitude, for below-poverty-line households: a 100% increase in net household income leads to a 1.04 percentage point decrease in the probability of pregnancy relative to a baseline probability of 13.9%. In contrast, for middle- and high-income households, the income effect is positive, although still small in magnitude: a 100% increase in income leads to 0.15 and 0.55 percentage point increases in the probability of pregnancy (with the latter effect significant at the 1% level) relative to respective baseline fertilities of 8.66% and 6.41%. Given the issues raised earlier concerning omitted variable bias and simultaneity, we defer further discussion of the income effect until we have confirmed this pattern using fixed effects and instrumental variables (sections IVE and IVF).

The child subsidy effect is statistically significant within each religious and ethnic subgroup except the ultra-Orthodox population. For the secular and Orthodox Jewish populations, we find effects similar to the overall population (0.87 and 0.99, both significant at the 1% level). For the ultra-Orthodox we find a smaller effect (0.34, with a p-value of 0.11), and in the Arab Muslim population, we find a much larger effect (1.73, significant at the 1% level). The fact that the effect is different across these groups is not surprising, since they differ from the overall population in terms of fertility and also from each other in terms of income and labor force participation. The small effect for the ultra-Orthodox is congruent with their strong religious and cultural norms in favor of fertility.

Finally, table 5 splits the sample by income category and religious group. Among both the secular and Orthodox, we find a decrease in responsiveness to the child subsidy as income increases. For the ultra-Orthodox, the effect is positive but small and not significant. For Arab Muslims, the effect is uniformly large across income levels and significant at the 1% level. We find positive and statistically significant income effects in the upper-income secular population and significantly negative effects in the below-poverty populations for all religious groups.

Overall, our results show a robustly positive price effect of the child subsidy on fertility. The effect is present for all religious groups but is weaker for the ultra-Orthodox Jewish population, which might be due to the strong social norms about fertility among this subgroup. The price effect of the child subsidy tends to decrease with income. We find a positive and significant income effect on fertility in the upper-income category and a negative and significant income effect among the poor, although the magnitude is consistently small.

D. *Effect by Age*

A qualification to the results we have presented thus far is they identify only the immediate impact of financial incentives on fertility rather than their impact on total fertility. Women could postpone pregnancies if they perceive the policy as unlikely to be maintained, or the policy could also affect age at first birth or the optimal spacing and timing of children.

Unfortunately, since the change in child subsidy that we are studying is recent and the horizon of our data is only seven years, we cannot identify the impact on total fertility for the overall population. However, for women nearing the end of their lifetime fertility, a temporary reduction in fertility is likely to translate into a permanent reduction in fertility.

Table 6 breaks down our results by age. We find a significant and positive effect of the child subsidy for each age category, with the coefficient decreasing among older mothers. The coefficient for 20 to 25 year olds is 25% larger than the coefficient for 35 to 40 year olds and almost five times the coefficient for 40 to 45 year olds. Since the probability of pregnancy decreases significantly with age, the magnitude of the effect relative to underlying fertility is greatest among women aged 35 to 40, followed by women aged 40 to 45. Since it is difficult for older women to postpone fertility, much of the child subsidy effect for these women likely reflects a reduction in total fertility rather than a postponement in fertility.

E. *Mother Fixed Effects*

One of the strengths of the data set that we have constructed is that it is longitudinal: it contains mother identi-

TABLE 5.—EFFECT BY INCOME CATEGORY AND RELIGION: NONPARAMETRIC FERTILITY CONTROLS

	Below Poverty Income	Above Poverty Income and Below 90%	Top 10%
Secular Jewish			
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	0.97***	0.83***	0.75**
	(0.20)	(0.28)	(0.37)
Log net household income × 100	−0.67***	0.51**	0.45**
	(0.11)	(0.23)	(0.21)
Mean probability of pregnancy × 100	5.0	5.5	5.6
Observations	146,605	449,907	69,571
Adjusted R^2	0.036	0.027	0.035
Orthodox Jewish			
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	1.37***	0.69**	0.55
	(0.29)	(0.29)	(0.57)
Log net household income × 100	−1.11***	0.20	0.14
	(0.19)	(0.43)	(0.67)
Mean probability of pregnancy × 100	10.6	11.5	10.2
Observations	48,390	103,753	17,977
Adjusted R^2	0.057	0.052	0.074
Ultra-Orthodox Jewish			
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	0.37	0.51	0.21
	(0.33)	(0.33)	(0.52)
Log net household income × 100	−1.26***	−6.06***	(0.20)
	(0.24)	(0.99)	(1.22)
Mean probability of pregnancy × 100	27.1	20.8	17.7
Observations	87,383	43,347	16,923
Adjusted R^2	0.088	0.097	0.084
Muslim			
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	1.76***	1.85***	1.47***
	(0.23)	(0.38)	(0.45)
Log net household income × 100	−1.57***	−8.25***	−1.86***
	(0.19)	(1.48)	(0.72)
Mean probability of pregnancy × 100	14.7	14.5	11.5
Observations	165,939	50,035	27,501
Adjusted R^2	0.081	0.069	0.070

Each panel and column presents the results of separate linear probability model regressions on subgroups defined by religious and income group. We control for the number and age distribution of children with number-of-children fixed effects; a full set of indicators for the number of children in the age ranges (0,4), (5,13), (14,17), and 18 and older; and full interactions of these two. We control for year effects using year dummies. Additional controls include reference fertility and education controls. Standard errors are in parentheses. Standard errors are clustered in year × number of children × age distribution of children cells. Statistically significant at ***0.01, **0.05, and *0.10.

TABLE 6.—EFFECT BY MOTHER'S AGE

	Younger Than 25 (1)	Between 25 and 30 (2)	Between 30 and 35 (3)	Between 35 and 40 (4)	Older Than 40 (5)
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	1.03**	1.18***	1.28***	0.83***	0.21*
	(0.50)	(0.24)	(0.15)	(0.16)	(0.11)
Log net household income × 100	−1.84***	−0.74***	0.24	0.05	−0.08***
	(0.19)	(0.21)	(0.15)	(0.07)	(0.02)
Mean probability of pregnancy × 100	26.3	19.0	13.1	6.8	1.8
Observations	44,616	196,776	365,299	387,308	239,343
Adjusted R^2	0.065	0.075	0.057	0.064	0.064

Linear probability models are presented. We control for the number and age distribution of children with number-of-children fixed effects; a full set of indicators for the number of children in the age ranges (0,4), (5,13), (14,17), and 18 and older; and full interactions of these two. We control for year effects using year dummies. Additional controls include reference fertility, education controls, and religious and ethnic group indicators. Standard errors are in parentheses. Standard errors are clustered in year × number of children × age distribution of children cells. Statistically significant at ***0.01, **0.05, and *0.10.

fiers, which allow us to estimate a mother fixed-effects model. Table 7 presents the results. We find a positive and statistically significant child subsidy effect in the overall population. We continue to find positive and statistically significant price effects when we split the sample by income and by religious groups.

The inclusion of fixed effects changes the interpretation of the results: we are now considering the impact of changes in child subsidies and log net household relative to their household-specific means. Comparing tables 4 and 7 for the overall sample and for all subgroups, we find a larger child subsidy effect. For the full sample, the effect is 66 percentage points larger, whereas for some subgroups (the top income decile and the ultra-Orthodox Jewish sample), the effect increases by a multiple. The income effects are similar across tables 4 and 7. Comparing table 8, where the results for the mother fixed-effect specification are broken down by income category and religious group, to table 5, we also find larger child subsidy effects in most subsamples.

A limitation of these results is that for younger parents, we are observing income at an age when it is likely to be

TABLE 7.—EFFECT BY INCOME CATEGORY AND BY RELIGIOUS GROUP: MOTHER FIXED EFFECTS

	Full Sample (1)	Below Poverty Income (2)	Above Poverty Income and Below 90% (3)	Top 10% (4)	Secular Jewish (5)	Orthodox Jewish (6)	Ultra-Orthodox Jewish (7)	Muslim Arabs (8)
Effect on probability of pregnancy of 150 NIS increase in subsidy × 100	1.65***	1.73***	1.35**	2.06***	2.07***	1.76***	1.40**	1.85***
	(0.56)	(0.53)	(0.65)	(0.74)	(0.78)	(0.62)	(0.60)	(0.64)
Log net household income × 100	−0.51***	−1.11***	0.64***	0.70***	0.10*	−0.16	−0.54*	−2.90***
	(0.11)	(0.18)	(0.14)	(0.19)	(0.06)	(0.19)	(0.32)	(0.25)
Mean probability of pregnancy × 100	10.3	13.92	8.66	6.41	5.4	11.1	24.2	14.3
Observations	1,355,095	529,283	684,416	141,396	705,005	180,938	177,428	291,724
Adjusted R^2	0.014	0.020	0.010	0.024	0.018	0.015	0.017	0.027

Linear probability models are presented. All specifications include mother fixed effects. We control for the number and age distribution of children with number-of-children fixed effects; a full set of indicators for the number of children in the age ranges (0,4), (5,13), (14,17), and 18 and older; and full interactions of these two. We control for year effects using year dummies. Additional controls include reference fertility; education controls; and, where relevant, religious and ethnic group indicators. Standard errors are in parentheses. Standard errors are clustered in year × number of children × age distribution of children cells. Statistically significant at ***0.01, **0.05, and *0.10.

TABLE 8.—EFFECT OF THE PRESENT VALUE OF CHILD ALLOWANCE BY INCOME CATEGORY AND RELIGIOUS GROUP WITH MOTHER FIXED EFFECTS

	Below Poverty Income (1)	Above Poverty Income and Below 90% (2)	Top 10% (3)
Secular Jewish			
Effect on probability of pregnancy of 150 NIS increase in subsidy × 100	2.48***	1.88***	1.98***
	(0.55)	(0.89)	(1.00)
Log net household income × 100	−0.59***	0.52	0.74*
	(0.11)	(0.12)	(0.22)
Mean probability of pregnancy × 100	5.0	5.5	5.6
Observations	0	0	0
Adjusted R^2	0.000	0.000	0.000
Orthodox Jewish			
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	2.30***	1.36***	1.66***
	(0.58)	(0.71)	(0.73)
Log net household income × 100	−1.14***	0.78***	0.86
	(0.26)	(0.32)	(0.67)
Mean probability of pregnancy × 100	10.6	11.5	10.2
Observations	0	0	0
Adjusted R^2	0.000	0.000	0.000
Ultra-Orthodox Jewish			
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	0.09**	0.98*	2.47**
	(0.67)	(0.66)	(0.58)
Log net household income × 100	−1.20***	1.70***	0.88
	(0.43)	(0.53)	(0.98)
Mean probability of pregnancy × 100	27.1	20.8	17.7
Observations	0	0	0
Adjusted R^2	0.000	0.000	0.000
Muslim			
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	1.96***	0.75***	2.26***
	(0.62)	(0.86)	(0.59)
Log net household income × 100	−3.39***	−2.20***	−0.40*
	(0.28)	(0.38)	(0.73)
Mean probability of pregnancy × 100	14.7	14.5	11.5
Observations	0	0	0
Adjusted R^2	0.000	0.000	0.000

Each panel and column presents results of separate linear probability model regressions on subgroups defined by religious and income group. All specifications include mother fixed effects. We control for the number and age distribution of children with number-of-children fixed effects; a full set of indicators for the number of children in the age ranges (0,4), (5,13), (14,17), and 18 and older; and full interactions of these two. We control for year effects using year dummies. Additional controls include reference fertility and education controls. Standard errors are in parentheses. Standard errors are clustered in year × number of children × age distribution of children cells. Statistically significant at ***0.01, **0.05, and *0.10.

increasing, hence a period when average income is below permanent income. Thus, we split the results by age in table 9 and focus on mothers age 30 and older (for younger mothers, we do not find a statistically significant child subsidy effect). For these three age ranges, we find child subsidy and income effects that are larger in absolute value than our OLS results in table 6 (indeed, much larger for mothers age 40 and older). This is consistent with households responding to a greater extent to deviations in the child subsidy and income from their averages than year-to-year changes (for example, sharply reducing fertility when the child subsidy decreases below its historical average). However, since the child subsidy did not return to its previous level after the decline in 2003, it is likely that for older mothers, reductions in fertility were permanent.

F. *Instrumenting for Income*

As noted in section IVE, mother fixed effects provide a useful robustness check for our child allowance and income

TABLE 9.—EFFECT BY MOTHER'S AGE: MOTHER FIXED EFFECTS

	Younger Than 25 (1)	Between 25 and 30 (2)	Between 30 and 35 (3)	Between 35 and 40 (4)	Older Than 40 (5)
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	−3.69	−0.99	0.94***	2.14***	1.87***
	(3.21)	(1.31)	(0.69)	(0.36)	(0.24)
Log net household income × 100	−1.80**	−1.01***	−0.61***	−0.35***	−0.27***
	(0.39)	(0.28)	(0.15)	(0.09)	(0.06)
Mean probability of pregnancy × 100	26.3	19.0	13.1	6.8	1.8
Observations	77,315	237,472	389,736	401,639	248,933
Adjusted R^2	0.008	0.011	0.016	0.029	0.067

Linear probability models are presented. All specifications include mother fixed effects. We control for the number and age distribution of children with number-of-children fixed effects; a full set of indicators for the number of children in the age ranges (0,4), (5,13), (14,17), and 18 and older; and full interactions of these two. We control for year effects using year dummies. Additional controls include reference fertility, education controls and religious and ethnic group indicators. Standard errors are in parentheses. Standard errors are clustered in year × number of children × age distribution of children cells. Statistically significant at ***0.01, **0.05, and *0.10.

TABLE 10.—EFFECT BY INCOME CATEGORY AND BY RELIGIOUS GROUP, INSTRUMENTING FOR INCOME

	Full Sample (1)	Below Poverty Income (2)	Above Poverty Income and Below 90% (3)	Top 10% (4)	Secular Jewish (5)	Orthodox Jewish (6)	Ultra-Orthodox Jewish (7)	Muslim Arabs (8)
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	0.86***	0.94***	0.67***	0.62**	0.67***	0.83***	0.35	1.46***
	(0.14)	(0.13)	(0.18)	(0.29)	(0.23)	(0.25)	(0.25)	(0.22)
Log net household income × 100	−0.39***	−1.34***	−3.48***	1.27	0.16**	−0.05	−3.05***	−0.52***
	(0.12)	(0.19)	(0.73)	(1.11)	(0.07)	(0.18)	(0.32)	(0.15)
Mean probability of pregnancy × 100	10.3	13.92	8.66	6.41	5.4	11.1	24.2	14.3
Observations	997,622	369,004	514,201	114,417	529,716	138,167	122,208	202,834
Adjusted R^2	0.101	0.120	0.075	0.056	0.030	0.057	0.097	0.077

Linear probability models are presented. We instrument for log net household income using lagged log husband's income. We control for the number and age distribution of children with number-of-children fixed effects; a full set of indicators for the number of children in the age ranges (0,4), (5,13), (14,17), and 18 and older; and full interactions of these two. We control for year effects using year dummies. Additional controls include reference fertility; education controls; and, where relevant, religious and ethnic group indicators. Standard errors are in parentheses. Standard errors are clustered in year × number of children × age distribution of children cells. Statistically significant at ***0.01, **0.05, and *0.10.

effects on fertility, but they control only for time-invariant mother and household characteristics. Mother fixed effects do not correct for the possible simultaneity of household income and fertility. For example, the negative income effect estimated for the below-poverty-line sample in tables 4 and 7 could merely reflect the fact that in poor households, fertility is associated with a reduction in labor supply. We address this concern by instrumenting for net household income using the husband's lagged income. The results are presented in table 10.

Instrumenting for income has no significant impact on the estimated child subsidy effect: it remains positive and statistically significant for all samples except the ultra-Orthodox, and the magnitudes are similar to table 4. The estimated income effects are also similar. We continue to find a negative income effect in the overall sample and in the below-poverty-line, ultra-Orthodox, and Arab Muslim samples, with larger magnitudes for all but the last group. For the top income decile, the income effect remains positive and has an increased magnitude, although it is no longer statistically significant. We continue to find a positive income effect for the secular Jewish population. Overall, this suggests that the pattern of price and income effects observed in table 4 is robust to instrumenting for income.

Table 11 provides the results for the instrumental variables specification broken down by income category and religious and ethnic group. These results follow a similar pattern to those displayed in table 5. The only difference is, again, with respect to the ultra-Orthodox population. Instrumenting for income, the effect of the child subsidy for the ultra-Orthodox population becomes statistically significant, although it remains smaller in magnitude than the effect in other subgroups.

Table 12 provides results for the instrumental variables specification broken down by mother's age. The results are similar to those presented in table 6, except for mothers older than age 40, for whom we do not find a significant child subsidy effect.

G. *Robustness Checks*

In this section we present three robustness checks for our main specification: identifying the child subsidy effect using just the 2003 Netanyahu reform, estimating the child subsidy effect under alternative assumptions regarding expectation formation, and estimating the child subsidy effect for high- versus low-fertility women.

Effect of the 2003 Netanyahu reform. The most dramatic, and arguably unanticipated, change in the child subsidy during our sample period occurred in 2003: the Netanyahu reform. This reform dramatically decreased the child subsidy for marginal births. As a robustness check, we

TABLE 11.—EFFECT OF THE PRESENT VALUE OF CHILD ALLOWANCE BY INCOME CATEGORY AND RELIGIOUS GROUP, INSTRUMENTING FOR INCOME

	Below Poverty Income (1)	Above Poverty Income and Below 90% (2)	Top 10% (3)
Secular Jewish			
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	0.86***	0.61***	0.53***
	(0.16)	(0.15)	(0.20)
Log net household income × 100	−0.37***	0.25	2.52*
	(0.18)	(0.39)	(1.32)
Mean probability of pregnancy × 100	5.0	5.5	5.6
Observations	115,489	356,354	57,873
Adjusted R^2	0.035	0.029	0.040
Orthodox Jewish			
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	1.20***	0.54***	0.48***
	(0.35)	(0.34)	(0.62)
Log net household income × 100	−0.34***	−2.41***	(1.72)
	(0.44)	(1.42)	(5.04)
Mean probability of pregnancy × 100	10.6	11.5	10.2
Observations	115,489	356,354	57,873
Adjusted R^2	0.035	0.029	0.040
Ultra-Orthodox Jewish			
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	0.45**	0.34*	0.13**
	(0.42)	(0.42)	(0.62)
Log net household income × 100	−5.09***	−35.36***	(1.08)
	(0.62)	(4.67)	(7.98)
Mean probability of pregnancy × 100	27.1	20.8	17.7
Observations	115,489	356,354	57,873
Adjusted R^2	0.035	0.029	0.040
Muslim			
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	1.49***	1.49***	1.32***
	(0.27)	(0.43)	(0.50)
Log net household income × 100	−0.76***	−16.44***	4.43*
	(0.24)	(7.54)	(4.80)
Mean probability of pregnancy × 100	14.7	14.5	11.5
Observations	115,489	356,354	57,873
Adjusted R^2	0.035	0.029	0.040

Each panel and column presents results of separate linear probability model regressions on subgroups defined by religious and income group. We instrument for log net household income using lagged log husband's income. We control for the number and age distribution of children with number-of-children fixed effects; a full set of indicators for the number of children in the age ranges (0,4), (5,13), (14,17), and 18 and older; and full interactions of these two. We control for year effects using year dummies. Additional controls include reference fertility and education controls. Standard errors are in parentheses. Standard errors are clustered in year × number of children × age distribution of children cells. Statistically significant at ***0.01, **0.05, and *0.10.

TABLE 12.—EFFECT BY MOTHERS' AGE, INSTRUMENTING FOR INCOME

	Younger Than 25 (1)	Between 25 and 30 (2)	Between 30 and 35 (3)	Between 35 and 40 (4)	Older Than 40 (5)
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	0.78	1.11***	1.22***	0.70***	0.17
	(0.14)	(0.13)	(0.18)	(0.16)	(0.12)
Log net household income × 100	−3.08***	−1.63**	−0.24	0.03	−0.08*
	(0.50)	(0.29)	(0.19)	(0.09)	(0.05)
Mean probability of pregnancy × 100	26.3	19.0	13.1	6.8	1.8
Observations	26,058	143,988	294,628	327,578	205,370
Adjusted R^2	0.052	0.065	0.054	0.065	0.063

Linear probability models are presented. We instrument for log net household income using lagged log husband's income. We control for the number and age distribution of children with number-of-children fixed effects; a full set of indicators for the number of children in the age ranges (0,4), (5,13), (14,17), and 18 and older; and full interactions of these two. We control for year effects using year dummies. Additional controls include reference fertility, education controls, and religious and ethnic group indicators. Standard errors are in parentheses. Standard errors are clustered in year × number of children × age distribution of children cells. Statistically significant at ***0.01, **0.05, and *0.10.

rerun our main specifications from table 4 using the years 2002 to 2004, hence identifying the effect just from this change in the child subsidy. The results are presented in table 13. For the overall sample and most subsamples, the child subsidy effect is somewhat smaller, although usually within two standard errors of the comparable results in table 4. In the ultra-Orthodox sample, the child subsidy effect is negative but close to 0 and not statistically significant; with the relatively large standard errors, we cannot reject the possibility of a positive effect comparable to table 4.

Alternative models of expectation formation. Our results thus far have used variation in the present value of child subsidy. As noted in section IIIB, because of the evolving nature of the child subsidy, it is possible that individuals do not take changes in it at face value. For example, given the steady increase in the subsidy for a fifth marginal child prior to 2001, a mother's behavior in 2001 might be predicated on the expectation of a continued gradual increase rather than the sharp increase in fact observed. We examine the implications of this for our results by using

Table 13.—Effect of the Present Value of Child Allowance by Income Category and by Religious Group, Nonparametric Fertility Controls, 2002–2004

	Full Sample (1)	Below Poverty Income (2)	Above Poverty Income and Below 90% (3)	Top 10% (4)	Secular Jewish (5)	Orthodox Jewish (6)	Ultra-Orthodox Jewish (7)	Muslim Arabs (8)
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	0.63***	0.58***	0.63***	0.57**	0.58***	0.83***	−0.04	0.93***
	(0.20)	(0.18)	(0.26)	(0.54)	(0.35)	(0.36)	(0.42)	(0.37)
Log net household income × 100	−0.05	−1.10***	0.33	0.20***	0.12*	0.03	−1.22***	−0.92***
	(0.14)	(0.17)	(0.53)	(0.31)	(0.09)	(0.16)	(0.25)	(0.17)
Mean probability of pregnancy × 100	10.3	13.92	8.66	6.41	5.4	11.1	24.2	14.3
Observations	525,086	193,015	271,958	60,113	280,773	72,801	63,996	104,917
Adjusted R^2	0.096	0.116	0.073	0.048	0.028	0.055	0.094	0.070

The model is estimated for the years 2002 to 2004. Linear probability models are presented. Additional controls include reference fertility; education controls; year fixed effects; number of children fixed effects, age distribution of children fixed effects, and full interactions of these two; and, where relevant, religious and ethnic group indicators. Standard errors are in parentheses. Standard errors are clustered in year × number of children × age distribution of children cells. Statistically significant at ***0.01, **0.05, and *0.10.

Table 14.—Effect of the Present Value of Child Allowance by Income Category and by Religious Group, Adaptive Expectations

	Full Sample (1)	Below Poverty Income (2)	Above Poverty Income and Below 90% (3)	Top 10% (4)	Secular Jewish (5)	Orthodox Jewish (6)	Ultra-Orthodox Jewish (7)	Muslim Arabs (8)
			A: Adaptive Expectations					
Effect on probability of pregnancy of NIS 150 increase in expected subsidy × 100	1.02***	0.99***	0.93***	0.49	1.08***	1.10***	0.29	1.42***
	(0.15)	(0.14)	(0.20)	(0.46)	(0.31)	(0.29)	(0.25)	(0.26)
Log net household income × 100	−0.06	−1.04***	0.15	0.56***	0.11*	−0.03	−1.22***	−0.96***
	(0.10)	(0.12)	(0.33)	(0.19)	(0.06)	(0.12)	(0.16)	(0.12)
Mean probability of pregnancy × 100	10.3	13.92	8.66	6.41	5.4	11.1	24.2	14.3
Observations	1,240,903	454,513	646,694	139,696	670,607	171,136	148,283	244,831
Adjusted R^2	0.102	0.121	0.077	0.051	0.028	0.053	0.095	0.078
			B: AR(1) Expectations					
Effect on probability of pregnancy of NIS 150 increase in expected subsidy × 100	0.93***	0.89***	0.86***	0.49	1.03***	1.04***	0.22	1.35***
	(0.13)	(0.12)	(0.18)	(0.42)	(0.28)	(0.26)	(0.22)	(0.23)
Log net household income × 100	−0.06	−1.04***	0.15	0.56***	0.11*	−0.03	−1.22***	−0.96***
	(0.10)	(0.12)	(0.33)	(0.19)	(0.06)	(0.12)	(0.16)	(0.12)
Mean probability of pregnancy × 100	10.3	13.92	8.66	6.41	5.4	11.1	24.2	14.3
Observations	1,240,903	454,513	646,694	139,696	670,607	171,136	148,283	244,831
Adjusted R^2	0.102	0.121	0.077	0.051	0.028	0.053	0.095	0.078
			C: Lagged Expectations					
Effect on probability of pregnancy of NIS 150 increase in expected subsidy × 100	0.91***	0.87***	0.85***	0.46**	1.02***	1.02***	0.22	1.28***
	(0.13)	(0.13)	(0.18)	(0.42)	(0.29)	(0.26)	(0.23)	(0.23)
Log net household income × 100	−0.06	−1.03***	0.15	0.56***	0.11*	−0.03	−1.22***	−0.96***
	(0.10)	(0.12)	(0.33)	(0.19)	(0.06)	(0.12)	(0.16)	(0.12)
Mean probability of pregnancy × 100	10.3	13.92	8.66	6.41	5.4	11.1	24.2	14.3
Observations	1,240,903	454,513	646,694	139,696	670,607	171,136	148,283	244,831
Adjusted R^2	0.102	0.121	0.077	0.051	0.028	0.053	0.095	0.078

Linear probability models are presented. We control for the number and age distribution of children with number-of-children fixed effects; a full set of indicators for the number of children in the age ranges (0,4), (5,13), (14,17), and 18 and older; and full interactions of these two. We control for year effects using year dummies. Additional controls include reference fertility; education controls; and, where relevant, religious and ethnic group indicators. The present value of the expected child subsidy is computed using, in panel A, adaptive expectations with an adjustment parameter of 0.5; in panel B, an AR(1) regression using data up to time $t-1$ to predict the child subsidy in time t; and in panel C, using the lagged child subsidy. Standard errors are in parentheses. Standard errors are clustered in year × number of children × age distribution of children cells. Statistically significant at ***0.01, **0.05, and *0.10.

three alternative models of expectation formation (depicted in figure 1), computing the present value of expected child subsidies for each model, and reestimating our results in table 14.

The three models of expectation formation we consider are adaptive expectations, with an adjustment parameter of 0.5; autoregressive expectations, where an individual's expectation of the child allowance at time t is based on the prediction of an AR(1) specification using observations up to time $t - 1$; and lagged expectations, where an individual's expectation of the child allowance at time t is the child allowance in the previous period. Figure 1 compares the evolution of the actual and expected child subsidy. All three expectation formation models match the actual child subsidy quite closely: adaptive expectations lagging behind and gradually catching up, lagged expectations always running one period behind, and autoregressive expectations generally adjusting quite rapidly.

In table 14, we see that the results are in most cases very close to our baseline specification. Across the three expectation formation schemes, the main effect ranges from 0.91 to 1.02, compared to 0.99 in table 4. The only subgroup for which results are somewhat different is the top income decile, for which the child subsidy effect is not statistically significant using adaptive and autoregressive expectations and smaller (albeit still significant at the 5% level) using lagged expectations.

Child subsidy effect for low- versus high-fertility women. In our main results, we did not examine the heterogeneity of the child subsidy effect by a woman's current number of children. The reason for this is that although our results are iden-

TABLE 15.—EFFECT OF THE CHILD ALLOWANCE BY THE PREDICTED NUMBER OF CHILDREN, 2001–2005

	Terciles of the Predicted Number of Children		
	Less than 2.52 (1)	[2.52, 3.42] (2)	More than 3.42 (3)
Effect on probability of pregnancy of NIS 150 increase in subsidy × 100	0.89***	0.94***	0.98***
	(0.32)	(0.25)	(0.33)
Log net household income × 100	0.60***	0.71**	−0.92***
	(0.17)	(0.20)	(0.20)
Mean probability of pregnancy × 100	13.92	8.66	6.41
Observations	86,515	86,515	89,136
Adjusted R^2	0.016	0.029	0.056

We predict the number of children for women from 2001 to 2005 using a regression of the number of children for women age 40 or older from 1999 to 2000. Linear probability models are presented. Additional controls include reference fertility; education controls; year fixed effects; number of children fixed effects, age distribution of children fixed effects, and full interactions of these two; and, where relevant, religious and ethnic group indicators. Standard errors are in parentheses. Standard errors are clustered in year × number of children × age distribution of children cells. Statistically significant at ***0.01, **0.05, and *0.10.

tified within number of children × age distribution cells, we use variation across these cells to identify year fixed effects. As an alternative to stratifying our results by the number of existing children, in table 15, we present results based on terciles of the expected number of children. Using demographic variables and income as predictors, we estimate completed fertility (among women older than 40) from 1999 to 2000 and use this model to predict expected completed fertility for women aged 35 to 40 from 2001 to 2005.

In table 15, we see that the child subsidy effect is quite similar across the columns, ranging from 0.98 among high-predicted-fertility women to 0.89 among low-expected-fertility women. Thus, the results in our main specification are unlikely to be driven just by high- or low-fertility women.

V. The Magnitude of Price and Income Effects

A. *Price and Benefit Elasticities*

Calculating the price elasticity of fertility is complicated by the lack of detailed data on the marginal cost of children. However, a back-of-the-envelope calculation is possible using tabulations on the marginal cost of children from Israel's National Insurance Institute. The estimated marginal financial cost of a child ranges from NIS 980 per month for the first child to NIS 770 per month for the fifth and subsequent children.[22] To this we add estimated forgone earnings as a result of childbearing. Since Israel provides three months of paid maternity leave, the primary forgone earnings from childbearing are for mothers who transition out of the labor force. Thus, our back-of-the-envelope estimate of forgone earnings due to childbearing is the product of average annual earnings among working mothers and the proportion of mothers who leave work as a result of having an additional child.[23]

From the range of coefficient estimates we have presented, we compute the elasticities based on our results in table 4 in which we control for the mother's fertility history nonparametrically but do not use mother fixed effects or instrument for income. Although mother fixed effects and instrumenting for income are useful robustness checks, we believe that the results in table 4 most cleanly and parsimoniously exploit our identification strategy.

In keeping with our previous calculations, we examine the impact of a NIS 150 change in the child subsidy, which approximately corresponds to the reduction in the marginal child subsidy for a third child between 2002 and 2003. For a third child, a NIS 150 reduction in the child subsidy raises the cost of a child by 18%.[24] Based on table 4, this is associated with a 0.99 percentage point (or a 9.6%) reduction in fertility, or an elasticity of 0.54 (with a standard error of 0.077).[25] Splitting the results by income group and by religious group (table 16) we find the largest price elasticity in the top income decile (0.88) and in the secular Jewish population (0.65). Although these two groups do not have the largest absolute response to the change in child subsidy, both have relatively low fertility and a high opportunity cost of time.

The finding that fertility is inelastic with respect to changes in the price of children accords with both the prior literature and Becker's (1960) theory of fertility, which suggests that the demand for children is akin to the demand for capital goods (whose price elasticity of demand is known to be low; see, for example, Chirinko, 1993). Laroque and

[22] The National Insurance Institute estimates for 2003, in NIS per month, are as follows: first child, 980; second child, 900; third child, 850; fourth child, 800; and fifth and further children, 770. These estimates include all goods and services expenses on children from food, clothing, footwear, and housing. See Sabag-Andelblad (2005).

[23] There are many reasons to be cautious about this imputation. Employed and unemployed mothers differ along an array of observable (and most likely unobservable) dimensions. This calculation does not account for either of these.

[24] We compute the price elasticity as follows. We consider an incremental child to a mother who already has two children and a change in child allowance from NIS 300 to 150 per month. The National Insurance Institute estimates the financial cost of a third child at NIS 850 per month. We estimate forgone earnings as the product of an employed mother's annual earnings (approximately NIS 60,600) and the incremental proportion of mothers who leave work because of a third child (0.058). Thus, the total cost changed from 850 + (60,600 × 0.058/12) – 300 = NIS 843 to 850 + (60,600 × 0.058/12) – 150 = 993, or an 18% increase in cost.

[25] For a NIS 150 change in child allowance, we calculate from table 4, column 1, that the change in fertility is 0.000066 × 150 = 0.0099. Thus, for a baseline probability of pregnancy of 0.103 (from table 2, column 1), we obtain a 0.096% change in fertility and an elasticity of 0.096/0.178 = 0.54. Standard errors are computed using the delta method, assuming that fertility is the only source of uncertainty and that cost data are not stochastic.

TABLE 16.—PRICES, BENEFIT, AND INCOME ELASTICITIES

Specification	Full Sample	Below Poverty Income	Above Poverty Income and Below 90%	Above 90th Pecentile	Secular Jewish	Orthodox Jewish	Ultra-Orthodox Jewish	Arabs
Price elasticity	0.540	0.333	0.546	0.884	0.645	0.490	0.100	0.745
	(0.077)	(0.005)	(0.010)	(0.026)	(0.014)	(0.024)	(0.031)	(0.023)
Comparisons to the literature								
Laroque and Salanié (2005)	0.2							
Benefit elasticity	0.192	0.151	0.196	0.229	0.325	0.178	0.029	0.243
	(0.028)	(0.018)	(0.043)	(0.098)	(0.092)	(0.045)	(0.018)	(0.032)
Comparisons to the literature								
Gauthier and Hatzius	0.16							
Zhang et al.	0.05–0.11							
Whittington et al.	0.127–0.248							
Milligan (2005)	0.107							
Income elasticity	−0.005973	−0.07449	0.0176	0.0862	0.0213	−0.00233	−0.0509	−0.0675
	(0.0993)	(0.00883)	(0.03843)	(0.02951)	(0.011)	(0.01)	(0.0066)	(0.00864)
Comparisons to the literature								
Hotz and Miller (1988)	0.02							
Black et al. (2008)	0.5							

Elasticities are computed for a marginal third child, with the child allowance increasing from NIS 150 per month to NIS 300 per month. Standard errors are in parentheses. Standard errors are computed using the delta method.

Salanié (2008) find a lower elasticity, 0.2. Their estimate, however, is derived from a structural model in which a woman assumes that each child is her last. In contrast, our estimates are for a marginal child conditional on the existing number of children.

Alternatively, we can scale our results to obtain a benefit elasticity. A NIS 150 reduction in the monthly child subsidy corresponds to a 50% decrease in the benefit for the marginal child, which from table 4, column 1, leads to a 9.6% reduction in fertility and a benefit elasticity of 0.19. Milligan (2005), who also estimates the effect of a change in benefits on the probability of a woman having a child in a given year, finds a benefit elasticity of 0.107 for Quebec and notes that this falls into the range of previous estimates (a long-run cross-country elasticity of 0.16 in Gauthier & Hatzius, 1997; an elasticity of 0.05 to 0.11 for Canada in Zhang, Quan, & van Meerbergn 1994; and elasticities ranging from 0.127 to 0.248 in Whittington, Alm, and Peters, 1990; see Milligan, 2005).

B. *Sign and Magnitude of the Income Effect*

In contrast to the robustly positive price effect of child subsidies on fertility, we find substantial heterogeneity in the income effect. In the overall population, the effect is negative and significant but negligible in magnitude, but this is because a negative income effect in below-poverty-line households offsets a positive effect in middle- and high-income households.

These results might appear surprising at first, since the literature on growth and fertility associates a negative income effect with wealthier populations and a positive income effect with poorer and less developed populations. However, Becker and Tomes (1976) argue that precisely such a pattern can be observed in microdata. In particular, in a model where child quality is partly inherited, the income elasticity of the parents' own contribution to quality will tend to be high at low income levels and decline with income. This leads to an increase in the observed income elasticity of quantity with income and in turn to the pattern that we observe. Sacerdote and Feyrer (2008) offer a complementary explanation in which initial increases in income and female labor force participation reduce fertility, but eventually fertility increases with income as women bear less responsibility for child care. Another possible explanation is social norms: large families are still commonly associated with wealth in the Israeli context.

Notwithstanding the varying sign of the income effect, our most consistent finding is that the magnitude of the income effect, whether positive or negative, is small: doubling income leads to at most a 1 percentage point change in fertility (for the below-poverty-line and ultra-Orthodox populations). This is underlined in table 16, where the estimated income elasticity ranges from –0.07 for the below-poverty-line group to 0.086 for the top-income decile. This is consistent with Becker's (1960) conjecture that the (quantity) elasticity of income is small, with the income elasticity estimated by Hotz and Miller (1988) and with Schultz's (1985) result that overall fertility is not very responsive to the male wage rate. Black et al. (2008) find a much larger income elasticity, although their estimate is an average effect from a significant structural shock to household income (coal prices in coal-producing regions).

VI. Conclusion

This paper has used a large individual-level panel data set with detailed controls and variation in Israel's child subsidy to investigate how fertility is influenced by financial incentives provided by government policies. We have studied not only how financial incentives affect fertility in the population as a whole, but also how these effects vary across income, ethnic, religious, and age subgroups. We have also been able to separate price and income effects.

We find a consistently positive effect of the child subsidy for a marginal child on fertility. The effect is present within all religious, ethnic, economic, and age subgroups, though it is weakest among those with relatively high income and among the ultra-Orthodox, who have strong norms with respect to fertility. The fact that we find an effect even among women aged 35 to 40 and aged 40 to 45 suggests that the effect we identify is at least in part an effect on total fertility and not only on the timing of births.

Consistent with Becker's (1960) conjecture, we find that the magnitude of the income effect on fertility is uniformly small. Although cross-country and within-country time-series evidence suggests large income effects, our results indicate that over a horizon of several years and when identified by plausibly exogenous variation, income effects on fertility are small in magnitude compared with price effects. Our results with respect to income effects also match the pattern conjectured by Becker and Tomes (1976): a negative income effect in the low-income group and a positive income effect in the higher-income group.

Overall, our results suggest that policies that change the price of a marginal child can be an effective instrument for governments that seek to influence the fertility rate. In contrast, government policies that affect income would not be expected to have a meaningful impact on fertility.

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APPENDIX A

Construction of Data Set and Variables

A. Fertility History and Basic Demographic Characteristics

From the Population Register's data set maintained by the ICBS, we obtain information on the following: the woman's date of birth, country of origin and year of immigration for individuals not born in Israel, the country of origin and year of immigration for parents of Israeli-born women, the number of children and their dates of birth, and information about the husband—date of birth, country of origin and year of immigration for men not born in Israel, and the country of origin and year of immigration for parents of Israeli-born men. We back-time from the date of birth to estimate the date of conception, which we use as the relevant date in our data set.

B. Education

We compile data on education of mothers and their husbands from various data sets maintained by the ICBS. The administrative records of Israel's higher education institutions provide information on the mother's and husband's most recent academic degrees. For individuals who do not appear in the higher education records, we obtain information on education from the school registry (created when parents register their children in public schools and public kindergartens).[26] For immigrants who do not appear in one of these sources, we obtain data on years of schooling from the immigration registry (data that they are required to provide when they immigrate to Israel).

In order to render the data on higher education degrees and years of schooling comparable across different countries and databases, we code the mother's and husband's education as a categorical variable on a 1 to 4 scale (for primary school, high school graduate, college, and postgraduate education). Because education data are missing for some women but available for their husbands and vice versa, we code education as the maximum of a woman's and her husband's education.[27] For observations where the data on education are available for both the mother and the husband, about 85% of the sample, the correlation is above 0.86. By using the maximum level of education, we reduce the number of missing observations considerably. Our results are similar when we use the mother's and husband's level of education separately and control for missing observations.[28]

C. Religion

Identifying the degree of religiosity for the Jewish population is challenging but essential for understanding fertility decisions. In Israel, there are three main degrees of religiosity for the Jewish population: secular, Orthodox and ultra-Orthodox. The boundaries among these three groups are somewhat porous. We infer the degree of religiosity for Jewish women by using information on the kind of kindergarten and school that their children attend. Portnoi (2007) has shown that this method is more reliable than alternatives.[29]

D. Income

Income data are obtained from a matched employer-employee database of income tax files. We have the following information for both mothers and their husbands: employment status (self-employed or wage earner), the number of jobs held, the number of months worked, gross income, industry of employment, income tax, mandatory health insurance contributions, and social security contributions. We use these data to create net household income, which is equal to the sum of mother's and husband's after-tax income, net of health insurance and social security contributions, and the subsidy that the mother is paid for her existing children.[30]

[26] In Israel, virtually all primary schools and preschool kindergartens are supported with public funds. Information on parents' school years was obtained for parents who had children already enrolled in primary school or public kindergartens and recorded information regarding their own years of schooling when registering their children.

[27] Although differences in education between husband and wife can be important for intrahousehold bargaining, in practice our results are very similar when we control separately for mothers' and husbands' education.

[28] Ultra-Orthodox Jewish men missing administrative records on education and reporting more than twelve years of education in the school or immigration registry are coded as having only twelve years of schooling. Since most ultra-Orthodox men spend many years engaged in religious study, any additional years of schooling that are not recorded are unlikely to reflect in their earnings potential.

[29] For example, Dahan (1998) suggests using husbands attending yeshiva as their last school to identify the ultra-Orthodox. But this method of identifying religiosity has been criticized for its inability to distinguish between the secular and the Orthodox and has been shown to bias downward estimates of the ultra-Orthodox population.

[30] It is widely believed that income is systematically underreported for ultra-Orthodox men and Arab Muslims, since they are less likely to participate in the formal labor market. This implies that for these populations, we are more likely to miscategorize when we split the sample by household income.

APPENDIX B

Variable Definitions

Variable	Description
Pregnant	Equal to 1 if the woman was pregnant in the calendar year and 0 otherwise. It is calculated by back-timing 39 weeks from the child's date of birth.
Present value of marginal child subsidy	The present value in 2007 NIS of the child subsidy a mother will receive for her next child until that child turns 18, using the announced benefit schedules and a discount rate of 5%.
Husband's age	The age of the husband in years.
Mother working	Equal to 1 if the mother had a positive annual salary and 0 otherwise.
Husband working	Equal to 1 if the husband had a positive annual salary and 0 otherwise.
Maximum education	Maximum of husband's and mother's level of education. Equal to 1 for primary school, 2 for high school graduate, 3 for college, and 4 for postgraduate education.
Age at first birth	Mother's age in years at first birth.
Reference fertility	The average number of children born five years ago within a reference group defined by a woman's religion, age, and education, and year.
Months from last birth	The number of months since the last birth.
Number of children	The number of children the women had.
Age distribution 0–4	The number of children age 4 or younger.
Age distribution 5–13	The number of children between ages 5 and 13.
Age distribution 14–17	The number of children between ages 14 and 17.
Mother/husband of Sephardic origin[a]	Equal to 1 if the mother or husband is Jewish and was born in the Middle East, Asia, North Africa, Morocco, Ethiopia, or Africa. If the mother or husband is native Israeli, then we look at her or his father's place of birth. Defined only for the Jewish population.
New immigrant[a]	Equal to 1 if either the mother or the husband is Jewish and immigrated to Israel after 1990.
Below-poverty-line income	Equal to 1 if net income in a given year is below that year's poverty line. This is computed by subgroup when presenting results by subgroup.
Above-poverty-line income and below the 90th percentile	Equal to 1 if net income is above poverty-line income and below the 90th percentile in that year. This is computed by subgroup when presenting results by subgroup.
Top 90%	Equal to 1 if net income is at or above the 90th percentile in that year. This is computed by subgroup when presenting results by subgroup.
Log net household income	Log of the mother's and husband's total income minus tax, plus annual child subsidy for existing children
Secular Jewish	Equal to 1 if the mother is Jewish and secular and 0 otherwise. In the regression specification, secular is the base religion category.
Orthodox Jewish	Equal to 1 if the mother if Jewish and Orthodox and 0 otherwise.
Ultra-Orthodox Jewish	Equal to 1 if the mother is ultra-Orthodox Jewish and 0 otherwise.
Arab Muslim	Equal to 1 if the mother is Arab Muslim and 0 otherwise.
Year dummy YYYY	Equal to 1 if the current year if equal to YYYY and 0 otherwise.

[a]Included as controls for specifications restricted to the Jewish population. Coefficients are suppressed.