Religiosity and Marital Fertility:

Israeli Arab Muslims, 1955-72*

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Religiosity and Marital Fertility: Israeli Arab Muslims, 1955-72

Abstract: This paper examines the relationship between religiosity and marital fertility in a Muslim society around the onset of the transition. Our questions are, first, whether the effect of religiosity remains significant after controlling for socioeconomic characteristics and variables associated with women's status; and, second, to what extent the decline in religiosity explains the transition. We use the 1973-74 Israeli Fertility Survey to investigate the effect of religiosity on marital fertility among Israeli Arab Muslims. In rural areas, where no decline is discernable yet, religiosity has a negative effect on marital fertility, while in urban areas the net effect is positive. The negative effect in rural areas is most likely due to differences in breastfeeding, the more religious breastfeeding longer following Quranic recommendations. We show that measures of women's status explain more than twenty percent of the net effect of religiosity in urban areas. Marital fertility in urban areas started to decline after 1966. We found no evidence for a contribution of the decline in religiosity to the timing of the onset of fertility decline. Neither does another cohort effect, women's education, contribute much. In general, period influences tend to be more powerful than cohort influences in explaining variations in marital fertility.

Religiosity and Marital Fertility: Israeli Arab Muslims, 1955-72

Fertility has been slow to change throughout the Arab world and in the northern portions of the Indian sub-continent. This has been attributed to Islam and to the low status of women in the region (Caldwell 1986, p. 175). Most studies have approached this issue by examining cross-sectional differences in fertility between Muslims and non-Muslims (Knodel and others 1999; Iyer 2002; Morgan et al. 2002; Dharmalingam and Morgan 2004). Typically, these studies model differences between religions as a dichotomy – Muslim or non-Muslim – ignoring variation in religiosity within and between religions, although there are exceptions, such as Iyer (2002). Omitting religiosity from the analysis may produce misleading results. What looks like an effect of Islam, for example, may not be due to differences between religions, but to Muslims being more religious.

If religion influences marital fertility, then religiosity should also. Several studies have documented a significant correlation between religiosity and reproductive behavior in Muslim populations (Eisenbach 1978; and 1986; Maloney et al. 1981; Azaiza 1996; Amin and others 1997; Kamal et al. 1999; Mistry 1999). Nevertheless, the study of the effect of religiosity on reproductive behavior among Muslims remains uncharted territory to a large extent, because these studies usually do not address the question what mediates the effect of religiosity on fertility. Hence, our first question is what explains the effect of religiosity.

Religiosity itself may have little independent influence, and socio-economic characteristics may account for part of the correlation between religiosity and fertility. After controlling for socio-economic characteristics, any effect of religiosity may be due to religious values concerning the use of contraceptive methods, the desired

number of children and women' status. The empirical results of this study suggest that part of the effect of religiosity in Muslim societies is due to women's status.

Most studies of the effect of religion and religiosity on fertility perform a cross-sectional analysis. Cross-sectional analyses, however, are not the ideal tool to study the causes of fertility *decline*. Thus, important questions, such as the contribution of the decline in religiosity to marital fertility decline remain outside their scope. Lesthaeghe and Wilson (1986, p. 291) consider a decline in religiosity to be a necessary condition for fertility decline. Their hypothesis has not been tested before in a Muslim population. Hence, our second question concerns the contribution of the decline in religiosity to the timing of the onset of the transition. We use pooled individual-level time series to model the effect of a decline in religiosity.

We used the 1973-74 Israeli Fertility Survey (IFS) which over-sampled the Arab population. This survey was conducted at an early stage of the fertility decline. Thus, the IFS provides a rare opportunity to examine the role of religiosity at the onset of marital fertility decline. Fertility among Israeli Arab Muslims was slow to respond to declining mortality and rising living standards (Friedlander, Eisenbach and Goldscheider 1979; Goldscheider 1999). Thus, we will try to determine whether religiosity has anything to do with the delay in the transition among Israeli Arab Muslims.

RELIGIOSITY AND FERTILITY

There are at least three hypotheses to explain the influence of religiosity on fertility (Goldscheider 1971). The characteristics hypothesis asserts that religiosity itself has little independent influence, and that it is the demographic, social and economic

characteristics of the more and less religious that largely account for the differences in reproductive behavior.

A second hypothesis asserts that differences in fertility between religions are due to specific values. This implies that within a religious group, differences should be related to the degree of religiosity (Anderson 1986, p. 300). A clear consensus exists among the major schools of Islamic law that family planning is permissible (Obermeyer 1992; Sachedina 1990). However, people may be ignorant of 'official' religious rulings. Knodel et al. (1999) and Iyer (2002), for example, observed that most Muslims believe their religion opposes contraception. A trained religious teacher in Israel explained that the belief Islam forbids contraception "is actually a very common misconception" (Kanaaneh 2002, p. 145).

Religious values may also influence fertility through breastfeeding patterns (Iyer 2002, p. 9). The Quran (2: 233) recommends breastfeeding for two whole years. This religious ruling is known at least to some women in Israel. A woman who had eleven children explained: "Islam tells us to have children, but each child must breast-feed for two years. I used to have a child every eleven months" (Kanaaneh 2002, p. 147). An average birth interval of about eleven months is evidence that this particular woman breastfed her children for much less than the recommended two years. Indirect evidence from the IFS strongly suggests that she is no exception and that a major decline in breastfeeding took place among Israeli Muslims (Schellekens and Eisenbach 2002).

Religious values may not only influence fertility directly through proximate variables, such as the use of contraceptive methods or breastfeeding, but also indirectly by increasing the number of children that couples desire without specifying a particular proximate determinant (McQuillan 2004, p. 31). Although, the Quran

states two purposes for marriage - love and procreation - some religious scholars argue that the procreative element is the major aspect of marriage (Sachedina 1990). Thus religious teachings may affect the number of children that couples desire.

Another class of religious values addresses broader issues of social organization that may ultimately affect marital fertility (McQuillan 2004, p. 30). Examining the case of Israeli Arab Muslims, Goldscheider (1999) argues that the group's high fertility does not reflect specific teachings related to contraception but rather Muslim views on the nature of familial relationships and the segregated roles of women. The traditional Muslim family is considered to be strongly patrilineal and patrilocal with male dominance and responsibility specifically prescribed by the Quran (Kirk 1966; Caldwell 1986, p. 175). Patriarchal systems can increase the demand for children because they usually limit women's non-familial opportunities for social status and economic support. Where women's opportunities outside the home are severely constrained, their survival strategies focus inward on family and children. Moreover, where group norms and practices limit women's mobility and their contact with non-family members, women's exposure to novel ideas or technological innovations, including contraceptives, may be constrained (Morgan, Stash, Smith and Mason 2002). The lower status and seclusion of women in Islamic societies has been attributed to the influence of religious texts. For example, religious texts specify that sons are to receive twice as great an inheritance as daughters, and that a man's testimony in court is worth twice that of a woman (Obermeyer 1992, p. 46). Patriarchal systems may quote such rulings to boost their support ignoring other religious rulings that are less sympathetic to their ideology.

A third hypothesis focuses on minority group status and is only relevant in the case of Muslims being a minority (Goldscheider and Uhlenberg 1969). If acculturation is

not desired and the group feels economically or politically disadvantaged, minority status may encourage higher fertility to ensure group preservation and strength in numbers. In Israel, Muslims are not only a religious minority, but also part of an ethnic one. Fargues (2000) argues that ethnic conflict may shape "ideational change related to fertility, sharpening identities and the vision of the nation as a quasi-biological body whose vitality is closely linked to reproduction, and thus make natalism a corollary of nationalism" (p. 442).

It has been argued that family formation causes greater religiosity (Hout and Greeley 1987, pp. 331-32). Thus, there may be reverse causation between reproduction and religiosity. Empirical studies, however, suggest that the level of religiosity is largely determined in adolescence remaining more or less constant for the rest of the life cycle. Thus, cohort profiles of religiosity after marriage are essentially parallel and flat (Lesthaeghe and Surkyn 1988, p. 21; Chaves 1989; Te Grotenhuis and Scheepers 2001; Tilley 2003; and Voas and Crockett 2005).

ISRAELI ARAB MUSLIM FERTILITY

In the 1960s, Israeli Muslim fertility was among the highest in the world, reaching a total fertility rate of more than nine births per woman, while cohort fertility peaked at about 8.5 births among women born in the 1920s and early 1930s. Probably, this rise was mostly due to a decline in breastfeeding (Schellekens and Eisenbach 2002).

Figure 1 presents estimates of Coale's marital fertility index – the ratio of the number of births occurring to married women to the number that would occur if married women were subject to maximum fertility – by rural/urban residence among Muslim women currently married in their first marriage in the 1972 and 1983 censuses using the own-children method (Coale and Treadway 1986; Cho, Retherford

and Choe 1986). In urban areas, marital fertility started to decline after 1966, while in rural areas there seems to be little evidence of a marital fertility decline before 1974. In the 1950s there was no rural/urban differential yet in marital fertility. Such a differential becomes visible around the onset of marital fertility decline in urban areas.

[Figure 1 about here]

Several explanations have been proposed for the timing of fertility reduction among Israeli Muslims (Friedlander, Eisenbach and Goldscheider 1979; Goldscheider 1999). Infant mortality is not among them, because it had been declining for over twenty years without any clear links to changes in fertility (see Figure 2). The timing of the decline may give us a clue to its causes. Marital fertility started to decline in 1967. This decline may plausibly be linked to the recession that had started in 1966 and that had lead to widespread unemployment among Israeli Arabs, in particular (Ben-Porath 1973b, p. 203; see Figure 3). After the recession, however, in 1969, marital fertility rose again to start its final decline in 1971. As the multivariate regression analyses will confirm below, marital fertility started its final decline, when Arab workers started to replace Jewish workers of Asian-African origin in traditional labor-intensive industries, construction and transport. The low-paying jobs in industry, building and agriculture previously held by Israel's Arabs now went to Palestinians from the Occupied Territories (Haidar 1995, p. 119).

[Figures 2 and 3 about here]

DATA AND VARIABLES

The 1973-74 Israeli Fertility Survey was carried out by the Department of Demography of the Hebrew University. About 3000 Israeli Arab women below the

age of 55 and currently in their first marriage were sampled, approximately 2300 of whom were Muslims. The women were asked about their birth histories, contraceptive methods, socioeconomic status, female autonomy, religiosity, and many other variables.

The dependent variable is a variable indicating whether a woman gave birth in a specific calendar year. The independent variables include a measure of religiosity, demographic and socio-economic variables and measures of women's status.

The survey asked the woman to define herself and her husband on a scale of religiosity and orthopraxis. The survey includes five questions on orthopraxis: (1) how often the woman and (2) her husband pray; (3) whether the woman and (4) her husband strictly fast during the month of Ramadan; and (5) whether the couple observes most religious commandments. We found no significant effect of religiosity on marital fertility using the self-definition variable of religiosity. Hence, we experimented with variables measuring orthopraxis. Kamal et al. (1999) used fasting during the Ramadan of the head of the household to measure religiosity. Preliminary analyses of the IFS data, however, revealed that a variable indicating whether the couple observes most religious commandments has a larger effect on marital fertility than all other orthopraxis variables including fasting during the Ramadan. Allowing for occasional changes in religiosity later in life, we have assumed that religiosity levels among Israeli Muslims are mostly determined before marriage. To the extent that this is correct, the level of religiosity measured at the time of the survey will reflect the level of religiosity during most of the preceding childbearing years.

We included the following demographic variables in our analyses: age of the woman; marital duration; infant mortality; the number of births or crude parity; and

the number of surviving children or net parity. We used a set of six age dummies to model the effect of the woman's age.

The death of an infant to a breastfeeding mother will shorten the post-partum infecundable period. To control for this physiological effect, we included a variable indicating whether an infant death occurred in the previous year.

We used a method developed by Van Bavel (2003) to uncover evidence for parity-dependent control. Van Bavel's model includes both net and crude parity. Net parity equals crude parity minus the number of children who died. Thus, after controlling for crude parity, the effect of net parity is exactly the opposite of the effect of the number of children who died. Although parity-dependent fertility control is a function of net rather than crude parity, the inclusion of crude parity is essential in order to control for fecundability and secondary sterility. There is a positive correlation between crude parity and fecundability, while there is a negative correlation between crude parity and secondary sterility. After controlling for crude parity, a negative correlation between net parity and subsequent fertility suggests the presence of family limitation in the broadest sense, including parity-dependent abstinence and reductions in coital frequency.

In our analyses, crude and net parity are lagged by one year. Crude parity was modeled as a count variable. Instead of modeling net parity as a count variable, as Van Bavel (2003) did, we modeled it by five dummy variables indicating two, three, four, five, and six children or more being alive in the previous year, one child or none being the reference category. This enables us to tell at what parity couples start limiting their family size.

We included four educational variables: (1) literacy of the woman and (2) that of her husband; and (3) whether the woman and (4) her husband finished at least eight

years of schooling. The analysis does not include additional socio-economic variables, such as income and labor-force participation of the woman, because these are not available on an annual basis for the period 1955-72. However, our measure of the education of the husband may serve as a (poor) proxy for life-time income (Ben-Porath 1973a). Labor-force participation of married Muslim women was still very low in the 1960s. Only 2.5 percent of the Muslim women in the IFS reported ever to have worked after marriage outside their household. Thus, the omission of this variable is unlikely to influence our results to any large extent.

Urban residence was defined as residence in one of the following towns at the time of the survey: Jaffa, Haifa, Acre, Ramleh, Lod, Nazareth, Shefar-A'm, Umm al-Fahm or Taibeh. Because rural-urban migration among Israeli Arabs in the period prior to the survey was limited, urban residence does not vary much over time and residence reported at the time of the survey mostly reflects residence during the period under investigation (Rosenfeld 1968).

The most commonly used measures of women's status are their educational and economic activity levels (Jejeebhoy and Sathar 2001). Thus, women's education is both a measure of socio-economic status and women's status. After controlling for the husband's education, women's education may more reflect women's status than socio-economic status. To measure women's autonomy, we added a dummy variable indicating whether the woman had any say in household decisions about minor purchases – 'no say' being coded as one. After marriage, a young woman may come under the authority of her husband's family, curtailing her autonomy. Hence, we added a dummy variable indicating co-residence of the woman with her in-laws after marriage. Co-residence may be related to socio-economic status and may change along the duration of marriage, with older, more economically established couples

moving earlier out of the parents' home. In order to minimize this problem, our measure of co-residence is a dummy variable that ignores the number of years in co-residence after marriage.

METHODOLOGY

The IFS data are in the form of event histories. A discrete-time hazard model is used to assess the effects of the independent variables on the probability of giving birth. Since the month of birth is missing for children that have died, we have assumed that the hazard for a birth is constant within annual intervals. It is now an accepted procedure to estimate discrete-time event-history models using logistic regression. This kind of analysis can accommodate two common features of event histories: censored data and time-varying variables, such as age and the occurrence of infant deaths (Allison 1982). Since we are not interested in a specific birth interval, but in fertility levels in general, we pooled birth intervals. This turns our model into a recurrent events history model (Box-Steffensmeier and Zorn 2002). The use of logistic regression to estimate the recurrent events history model turns the analysis into a binary time-series-cross-section analysis. In spite of its potential, this kind of model is still rare in fertility studies (Raftery, Lewis and Aghajanian 1995; McDonald and Rosina 2001; Sear, Mace and McGregor 2003; and Steele et al 2005). This type of analysis, for example, is a convenient way to model age, period and cohort effects (Raftery, Lewis and Aghajanian 1995).

Researchers typically analyze time-series-cross-section data with a binary dependent variable assuming temporal independence. However, observations in a time-series are likely to be temporally dependent. Ignoring this may lead to misleading results (Beck et al. 1998). Our solution is to add a lagged dependent

variable. A random effect was added to the model in order to control for unobserved heterogeneity between women due to fecundity, coital frequency and other variables (Amemiya 1985, pp. 348-352; Yamaguchi 1986). We have assumed that unobserved heterogeneity in the risk of a birth does not depend on parity (McDonald and Rosina 2001, p. 265). MIXNO, a computer program for mixed-effects logistic regression, was used to estimate the coefficients (Hedeker 1999).

The dependent variable in the statistical model is the annual log odds of giving birth. The unit of analysis is the "woman-year"; that is, each woman contributes as many units to the analysis as the number for which she is observed. In the calendar year of their marriage women on average are exposed to sexual intercourse for less than one year. Hence, we have added a dummy variable indicating the first year of marriage. Women for whom a variable is missing were omitted from the regression analyses. To minimize recall errors, especially of infant deaths, the relatively small number of woman-years before 1955 was discarded. Thus the analysis includes 2,113 women, together contributing 24,474 woman-years.

RESULTS

Table 1 presents age-specific marital fertility rates and total marital fertility rates (TMFR) by level of religiosity and rural/urban residence before and during the marital fertility decline. Using Coale's marital fertility index as a criterion, marital fertility in urban areas seems to have started to decline after 1966 (see Figure 1). Allowing for some inaccuracy, we will refer to the periods 1955-66 and 1967-72 in urban areas as 'before the transition' and 'during the transition,' respectively. In rural areas the total marital fertility rate of the more religious is *lower* than that of their less religious neighbors, while in urban areas the more religious have a *higher* total marital fertility

rate than their less religious neighbors. This is true for both periods. Before the transition the total marital fertility rate among more religious couples in urban areas resembles that of more religious couples in rural areas. Note that the *crude* effect of religiosity is small in urban areas. This is probably due to religiosity affecting marital fertility in urban areas through two proximate determinants, whose effects almost cancel each other out. As we will show below, the *net* effect of religiosity in urban areas is much larger. However, a comparison of total marital fertility rates is an inaccurate method to detect family limitation.

[Table 1 about here]

The negative correlation between fertility and religiosity in rural areas may be due to differences in breastfeeding patterns, while the positive correlation between fertility and religiosity in urban areas may be due to family limitation. An examination of the shape of the marital fertility function by age seems to support this. The age pattern becomes more apparent when the value for the age group 20-24 in each schedule is taken as 100, as is done in Figures 4 and 5. For comparison, a population with 'natural fertility' – the Hutterites – has been added to the figures. In the pre-decline period, the age-pattern of all groups shows a fairly close resemblance to that of the Hutterites, suggesting that any differences in the level of marital fertility between groups are mostly due to differences in breastfeeding and to spacing or the use of contraceptive methods to increase the length of intervals between births (see Figure 4). Like that of the Hutterites, pre-decline fertility among all groups shows a pattern of slow decline up to age 35-39, falling rapidly thereafter. In a situation of family limitation, as couples reach their desired family size, they make efforts to reduce or cease further childbearing, and thus lower fertility. For this reason, fertility rates fall more rapidly as age, and hence parity, increases (Wilson 1984, p. 229). Figure 5 shows that among

less religious women in urban areas during the fertility decline marital fertility declines at a similar speed before age 35-39 and after age 35-39. This constitutes evidence for family limitation in urban areas after 1966. During the transition, marital fertility among the more religious women in urban areas declines at a slightly slower pace before age 35-39 than after age 35-39. Thus, more religious women in urban areas seem to occupy an intermediate position between less religious women in urban areas and rural women.

[Figures 4 and 5 about here]

However, the age pattern of marital fertility is not a sufficiently accurate method to detect family limitation. Hence, we now turn to direct evidence from the survey on the use of contraceptive methods, as reported in answers to a question on the first interval when the couple started to use contraceptive methods. Figure 6 presents the cumulative percentage of couples who ever used contraceptive methods for each birth interval by religiosity and rural/urban residence. It shows that less religious urban couples started to use contraceptive methods much earlier than any of the other groups. Note that even in rural areas more than a quarter of the women reported to have used contraceptive methods at some point. In rural areas there is little difference between the more and less religious couples concerning the use of contraceptives raising the likelihood that any differences between the two groups are due to breastfeeding.

[Figure 6 about here]

The IFS asked several questions about religious values as perceived by the women. Less religious urban women agreed less often than any other category of women when asked whether Islam forbids the use of contraceptive methods or whether Islam encourages large families (see Table 2). There is also some support for the minority

group status hypothesis. Between thirty and forty percent of the women agreed that "the wish to raise Arab population size in Israel is a major reason for having a large family." More religious women were more likely to agree, in rural as well as urban areas.

[Table 2 about here]

While a majority of women in the survey, and in particular the more religious, seem to perceive Islam as proscribing contraceptive methods and encouraging large families, this does not necessarily mean that marital fertility differentials are mostly due to religious values. Rationalization of past behavior may have influenced some of the answers given, for example. Thus, we now turn to a multivariate analysis of marital fertility in order to determine what mediates the effect of religiosity.

When controlling for age, marital duration, and first year of marriage only, religiosity does not have a significant effect (results not shown). Table 1 suggests that this may be due to the positive and negative effects of religiosity canceling each other out. Since we suspected that the sign of the effect differs between rural and urban areas, we added an interaction effect between religiosity and rural/urban residence.

Table 4 presents the coefficients (odds ratios) of a sequential logistic regression analysis (see Table 3 for means and standard deviations of variables). Note that as one moves from Model 1 to Model 4, more covariates are added to the analysis. Model 1 controlls for age, marital duration, first year of marriage and urban residence only. Religiosity now has a very significant *negative* main effect, while the interaction between urban residence and religiosity has a very significant but *positive* effect. The interpretation of the interaction effect is not straightforward. It is not the *total* effect of religiosity in urban areas, but the *net* effect of religiosity in urban areas, i.e. the effect

after controlling for the main effect, which we suspect is due to religious differentials in breastfeeding.

[Tables 3 and 4 about here]

Model 2 tests the hypothesis that religiosity affects marital fertility through socio-economic characteristics by adding four educational variables and a variable indicating whether an infant died in the previous year. We suspect that the negative main effect of religiosity is due to differentials in breast-feeding. The literature strongly supports the existence of an inverse effect of education on the duration of breast-feeding (Jejeebhoy 1995). The size of the main effect of religiosity, however, is now larger, suggesting that the lower fertility among the more religious is not due to lower education. The size of the interaction effect of religiosity with urban residence, on the other hand, is slightly smaller than in the first model. This is mostly due to the inclusion of women's education and very little to infant mortality (results not shown). This indicates that part of the effect of religiosity in urban areas may be due to socio-economic characteristics.

Model 3 adds two indirect measures of patriarchy and women's autonomy to try to determine whether they partly mediate the positive effect of religiosity in urban areas on marital fertility. Note that our indirect measure of women's autonomy, co-residence with in-laws, has a very significant effect on fertility. The dummy variable indicating whether the woman has any say in decisions about minor purchases, on the other hand, does not have a significant effect, although the effect is not small. Moreover, the effect of this variable has an unexpected sign: women who have little say in minor purchases are *less* likely to give birth (compare Morgan et al 2002, p. 532). After the inclusion of these variables, the size of the main effect of religiosity declines to the level of the first model, while the interaction effect declines further

below that of the second model, suggesting that part of the effect of religiosity in urban areas is mediated by patriarchy and women's autonomy. Most of the change between the second and third model in the effect of religiosity in urban areas is due to the addition of co-residence with in-laws after marriage.

Model 4 adds crude and net parity to investigate whether the positive effect of religiosity in urban areas is due to parity-dependent fertility control. The net parity dummies have a significant effect on marital fertility starting from parity five, although the effect of parity four is not small and significant at 10 percent in a one-sided test. The interaction effect declines still further, suggesting that part of the effect of religiosity in urban areas is mediated by net parity. This suggests that most couples started limiting their fertility after they had five children. This finding is consistent with the interval – the sixth or later - at which most couples started to use contraceptive methods for the first time as reported by the women themselves (see Figure 6). The addition of crude and net parity causes a small decline in the main effect of religiosity. It causes a larger decline in the interaction effect, suggesting that parity-dependent fertility control explains part of the effect of religiosity in urban areas.

After the addition of variables in models 2-4 of Table 4, both the main effect and the interaction remain significant. However, the size of the effect of the interaction between religiosity and urban residence is reduced. Thus, the variables that were added in Table 4 probably explain part of the interaction effect. The size of the main effect of religiosity in the fourth model, on the other hand, is only slightly smaller than that in the first model. The extent of the attenuation in both effects becomes more apparent when the percentage changes in the odds ($100 \times [e^b - 1]$ %) due to the main and interaction effects of religiosity are plotted in a diagram. By switching the coding

for the main effect of religiosity ($1 / e^b$), our estimate changes sign and its size becomes comparable with the interaction effect. Figure 7 shows that the main effect barely changed between the first and last model, while the addition of covariates attenuates the interaction effect by almost a third between the first and fourth model.

[Figure 7 about here]

Religiosity has declined among Israeli Muslims. Hence, our second question concerns the contribution of the decline in religiosity to the timing of the onset of the transition. Figure 8 presents major trends in the decline in religiosity as reported in the IFS and those in the number of children ever born (CEB) to Israeli Muslims as reported in the 1995 Census by birth cohort. Religiosity was already declining among cohorts born in the 1920s. Thus the decline in religiosity predates the decline in fertility which started among women born in 1935-39. Hence, while a decline in religiosity may have been a precondition for fertility decline, it is unlikely to have been its immediate cause.

[Figure 8 about here]

Religiosity is not the only possible cohort effect in the decline. Female education is another one. The decline in the percentage of women who finished less than eight years of schooling starts at about the same time as the fertility decline (see Figure 8). Education is a cohort effect and religiosity probably is one as well. Thus our question is part of a more general question: What is the contribution of cohort effects to the transition?

A multivariate analysis confirms that the decline in religiosity is not related to the timing of the onset of fertility decline. Table 5 presents a sequential analysis of the contribution of the decline in religiosity to the onset of fertility decline. The first model includes time dummies for each year and interactions of these time dummies

with urban residence, the reference period being 1960-64. The time dummies for 1955-58 show what seems to be the last stage of the pre-decline rise in marital fertility. Few of the urban time dummies for this period are significant, suggesting that only minor differences existed between rural and urban areas. After 1966, the main effect of the time dummies suggests that marital fertility in rural areas settled at a lower level without showing a clear trend. Since the main effect of the period variables does not show a clear trend after 1966, the decline in the effect of the time dummies for urban areas suggests that marital fertility there started to decline after 1966.

[Table 5 about here]

To what extent are the period effects due to a gradual replacement of older cohorts by younger ones? The replacement effect of cohorts is unlikely to be large, since the decline in religiosity was a gradual process, while marital fertility started to decline quite suddenly. The second model confirms this by showing that neither religiosity nor women's education have much of an impact on the time dummies (see Figure 9). Thus, they neither explain the rise in marital fertility in 1955-58 nor the timing of marital fertility decline. Neither are there more general cohort influences at such an early stage of fertility decline. To investigate this, we replaced the period dummies in the first model with cohort dummies and interaction effects between the cohort dummies and urban residence. Whether we use cohorts of one year or five years, none of these dummies shows a significant effect on fertility (results not shown). Thus, the timing of the urban marital fertility decline among Israeli Arab Muslims is mostly due to period influences. Most age groups seem to have been involved in the fertility decline from the start. Cohort variables, such as religiosity and education do not have such a small effect, but they mostly explain cross-sectional variance.

[Figure 9 about here]

The results presented in Table 5 indicate that marital fertility in urban areas declined in 1967, but resurged after 1968. This episode may plausibly be linked with the recession of 1966-67, when unemployment was high (Figure 9; Ben-Porath 1973b). A sustained fertility decline in urban areas only started after 1970. A likely explanation for this decline is the shift from low-paying jobs in industry, building and agriculture to better-paying ones in labor-intensive industries, construction and transport, as suggested by the timing (see Figure 3).

CONCLUSION AND DISCUSSION

The 1973-74 Israeli Fertility Survey presents a rare opportunity to study the effect of religiosity in a population on the eve of fertility decline and immediately after its onset. The results of our analysis reveal an intricate relationship between religiosity and marital fertility for this period. While religiosity has a positive net effect on marital fertility in urban areas, in rural areas its effect is negative. After controlling for socio-economic characteristics, and measures of women's autonomy, the negative main effect remains almost unchanged. The hypothesis that in Islam religious values may influence fertility through breastfeeding patterns is consistent with this finding.

Unfortunately, there are no studies of the ways in which religiosity may influence marital fertility in Muslim countries to compare with our results. As a poor substitute, we will compare our results with those of studies of the effect of religion. Morgan et al (2002), for example, compared the fertility of Muslim women in non-Islamic countries in Asia with that of their non-Muslim neighbors. They did not find that women's education attenuates the effect of religion. Our results, on the other hand, seem to indicate that women's education does attenuate the net effect of religiosity in

urban areas. Thus, part of the effect of religiosity may be due to socio-economic characteristics of the couple.

After controlling for socio-economic characteristics, the net effect of religiosity in urban areas remains significant. A measure of women's autonomy, co-residence after marriage with the husband's parents, reduces the net effect of religiosity in urban areas still further. Given the difficulty of measuring women's autonomy, this is likely to be a conservative estimate of the amount of the net effect of religiosity in urban areas which is explained by women's autonomy.

Morgan et al (2002) reported that autonomy differentials do not explain the greater pronatalist attitudes of Muslim communities. Our results suggest that one indirect measure of female autonomy, at least, attenuates the net effect of religiosity in urban areas. Finding differentials neither in autonomy nor in educational, Morgan et al (2002, p. 533) argue that their empirical evidence does not support the link between religion, women's status and fertility. Our empirical evidence, on the other hand, suggests that measures of women's status, such as women's education and co-residence, explain more than twenty percent of the net effect of religiosity in urban areas (see Figure 7). Of course, our results are not strictly comparable with those of Morgan et al (2002). We modeled actual marital fertility, while they modeled the desire for more children and contraceptive use.

Muslims in Israel are a minority. In the view of Dharmalingam and Morgan (2004) the minority-group-status hypothesis is the more likely explanation for the relatively high fertility of Muslims. According to the minority-group-status hypothesis, political conflict affects fertility directly through the desired number of children. After controlling for socio-economic characteristics and indirect measures of patriarchy and women's status, the net effect of religiosity among urban Israeli Muslims remains

positive. Much of the remaining net effect of religiosity in urban areas could be due to the influence of religious values concerning the use of contraceptive methods and the desired number of children, net of women's status. However, our analysis does not enable us to determine to what extent other religious values and minority-group-status account for the remaining net effect of religiosity in urban areas. The answers of women to questions concerning values influencing reproductive behaviour provide support for both hypotheses.

Carlsson (1966) classified explanations of the fertility decline into two categories: adjustment and innovation. The view of fertility decline as an adjustment states that fertility control reflects an adjustment to economic and social change. The view of the decline as a process of innovation, on the other hand, states that the adoption of fertility control represents new behavior due to changes in the acceptability of fertility control on moral grounds. A decline in religiosity, for example, may have made fertility control more acceptable.

Lesthaeghe and Wilson (1986, p. 291) consider a decline in religiosity to be a necessary condition for fertility decline. If religiosity levels are mostly determined before marriage, then our results suggest that trends in religiosity do not explain the timing of the onset of marital fertility decline. Of course, the decline in religiosity may have influenced the pace of fertility decline after 1974. In the last thirty years there has been a plateau in Israeli Arab Muslim fertility (see Figure 2). The role of a possible religious revival in this lull in the fertility transition remains to be investigated.

In general, our results seem to indicate that period influences tend to be more powerful than cohort influences in explaining variations in fertility. Other empirical studies of fertility trends report similar findings (Foster 1990; Ní Bhrolcháin 1992;

Raftery et al. 1995). If changes in period effects are more likely to reflect economic than cultural change, then the view of fertility decline as a process of adjustment seems to be more consistent with our data than that of fertility decline as an innovation.

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Table 1. Age-specific marital fertility rates and total marital fertility rate (TMFR) by degree of religiosity, rural/urban residence and period.

	Pre-decline (1955-66)				During decline	
	More religious	Less religious	More religious	Less religious	More religious	Less religious
Age group	**Rural**	**Rural**	**Urban**	**Urban**	**Urban**	**Urban**
20-24	466.9	521.4	489.2	485.4	493.5	476.3
25-29	470.4	497.1	475.0	454.0	416.4	376.3
30-34	395.4	414.1	426.7	376.1	360.1	304.4
35-39	309.0	364.2	287.1	256.5	233.2	239.9
40-44	177.8	194.3	168.1	172.7	82.0	112.4
45-49	44.5	10.9	12.3	-	15.5	29.4
Woman years	6,343	7,588	2,421	2,403	1,620	2,304
TMFR	9.3	10.0	9.3	8.8	8.0	7.7

Note: rates based on less than fifty women-years have been omitted. This causes only a slight bias downwards in TMFR.

Table 2. Religious doctrines concerning fertility as perceived by the women and nationalism as a factor in fertility by religiosity and rural/urban residence

	More religious Rural	Less religious Rural	More religious Urban	Less religious Urban
Islam permits contraceptive methods				
No	69.2	65.8	65.0	47.2
Yes	16.3	19.8	24.3	29.4
Don't know	14.5	14.3	10.4	23.2
No answer	0.0	0.1	0.3	0.2
Islam encourages large families				
Yes	73.0	69.2	77.7	56.9
No	11.1	12.7	13.9	18.7
Don't know	15.7	18.0	7.8	24.4
No answer	0.2	0.1	0.6	0.0
Wish to raise Arab population size is a major reason for having a large family				
Yes	40.0	36.1	42.5	32.4
No	41.9	51.9	32.4	43.9
Everything is in the hands of God	18.0	11.8	25.1	23.7
No answer	0.1	0.2	0.0	0.0
Total	100.0	100.0	100.0	100.0
Number of women	523	845	346	578

Table 3. Means and Standard Deviations of Variables in Analyses

Variable	**Mean***	**S.D.**
Births per woman-year	0.383	0.486
Age:		
15-19	0.092	0.289
20-24	0.228	-
25-29	0.228	0.420
30-34	0.184	0.388
35-39	0.138	0.345
40-44	0.086	0.280
45-49	0.044	0.205
Marital duration	11.025	8.239
First year of marriage	0.056	0.230
Religious	0.442	0.497
Urban	0.390	0.488
Urban religious	0.175	0.380
Woman literate	0.280	0.449
Husband literate	0.787	0.409
Woman studied ≥ 8 years	0.175	0.380
Husband studied ≥ 8 years	0.559	0.496
Infant death (*t*-1)	0.019	0.136
Crude parity (*t*-1)	4.243	3.351
Net parity:		
0-1	0.279	-
2	0.111	0.314
3	0.111	0.314
4	0.110	0.313
5	0.103	0.304
6+	0.286	0.452
Co-residence with parents	0.505	0.500
Husband decides	0.060	0.237
Number of births	9,372	
Woman-years	24,474	

Note: * means over woman-years.

Table 4. Event history analysis of births: explaining the effect of religiosity

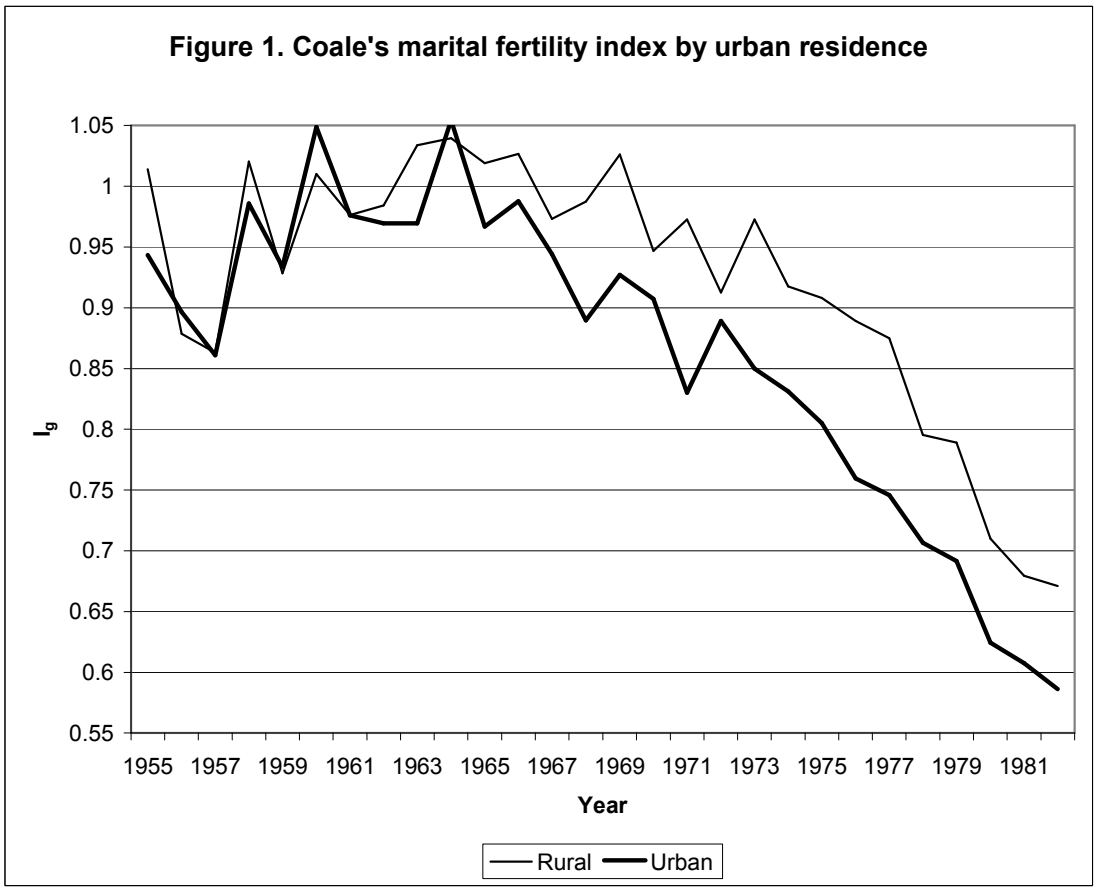
	Model 1		Model 2	
Variable	e^b	**p-value**	e^b	**p-value**
Age:				
15-19	0.694	0.000	0.703	0.000
20-24	1.000	-	1.000	-
25-29	0.949	0.244	0.944	0.199
30-34	0.810	0.001	0.806	0.000
35-39	0.656	0.000	0.653	0.000
40-44	0.307	0.000	0.307	0.000
45-49	0.086	0.000	0.088	0.000
Marital duration	0.945	0.000	0.942	0.000
First year of marriage	0.030	0.000	0.031	0.000
Birth (*t*-1)	0.339	0.000	0.330	0.000
Religious	0.832	0.001	0.819	0.000
Urban	0.708	0.000	0.754	0.000
Urban religious	1.350	0.001	1.302	0.002
Woman's literacy			0.909	0.155
Husband's literacy			0.983	0.779
Woman studied ≥ 8 years			0.815	0.008
Husband studied ≥ 8 years			1.013	0.800
Infant death (*t*-1)			2.050	0.000
Intercept	2.925	0.000	3.190	0.000
S. D. random effect	0.649	0.000	0.634	0.000
-2 Log Likelihood				
Initial	32,574.093		32,574.093	
Final	28,535.482		28,462.634	

Table 4. Continued.

Variable	Model 3 e^b	Model 3 p-value	Model 4 e^b	Model 4 p-value
Age of woman:				
15-19	0.696	0.000	0.731	0.000
20-24	1.000	-	1.000	-
25-29	0.954	0.292	0.951	0.294
30-34	0.823	0.001	0.830	0.004
35-39	0.673	0.000	0.665	0.000
40-44	0.320	0.000	0.311	0.000
45-49	0.091	0.000	0.092	0.000
Marital duration	0.941	0.000	0.931	0.000
First year of marriage	0.031	0.000	0.033	0.000
Birth (*t*-1)	0.330	0.000	0.327	0.000
Religious	0.831	0.001	0.840	0.001
Urban	0.753	0.000	0.762	0.000
Urban religious	1.271	0.005	1.241	0.009
Woman's literacy	0.917	0.193	0.917	0.178
Husband's literacy	0.985	0.808	0.986	0.812
Woman studied ≥ 8 years	0.828	0.015	0.833	0.014
Husband studied ≥ 8 years	1.009	0.864	1.008	0.871
Infant death (*t*-1)	2.032	0.000	1.963	0.000
Co-residence with parents	1.227	0.000	1.206	0.000
Husband decides	0.880	0.135	0.884	0.134
Crude parity (*t*-1)			1.072	0.000
Net parity:				
0-1			1.000	-
2			1.048	0.440
3			0.963	0.589
4			0.888	0.147
5			0.805	0.021
6+			0.748	0.012
Intercept	2.891	0.000	2.710	0.000
S. D. random effect	0.626	0.000	0.579	0.000
-2 Log Likelihood				
Initial	32,574.093		32,574.093	
Final	28,437.124		28,417.255	

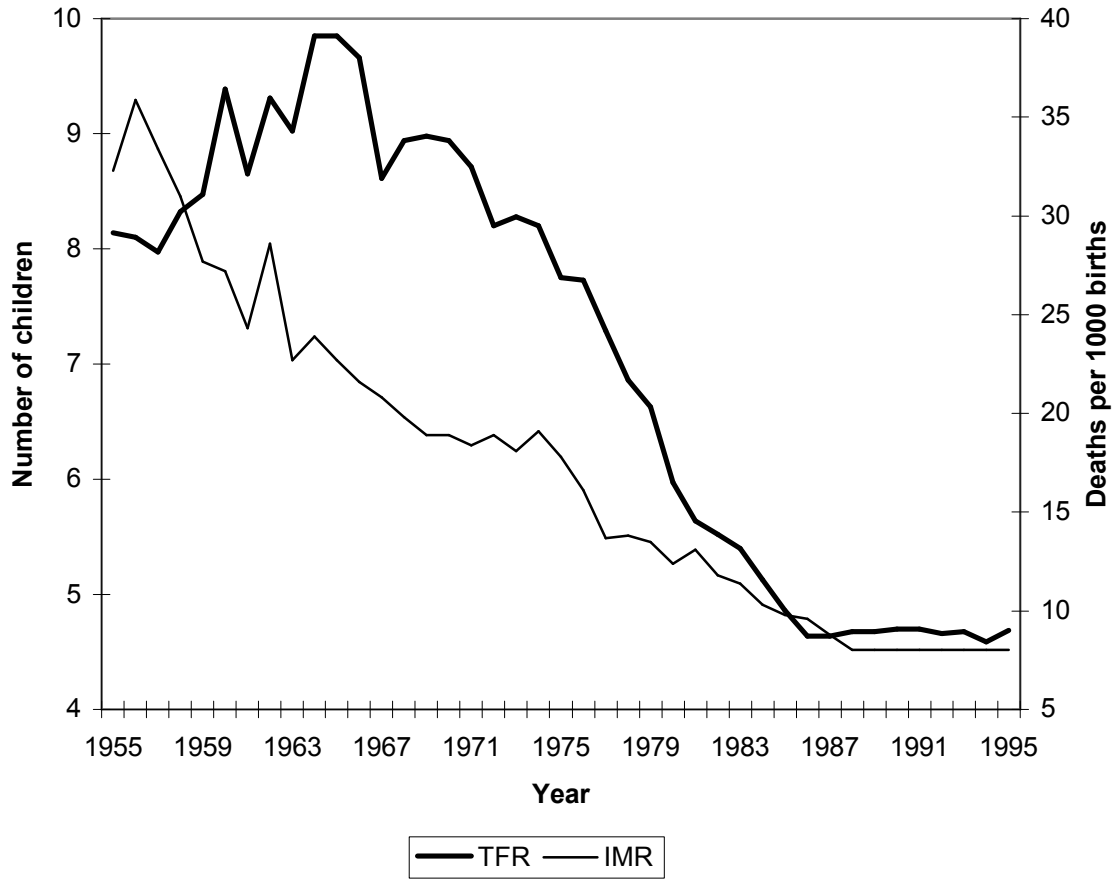
Table 5. Discrete-time event history analysis of births: explaining the decline.

Variable	Model 1		Model 2	
	e^b	*p*-value	e^b	*p*-value
Age of woman:				
15-19	0.685	0.000	0.696	0.000
20-24	1.000	-	1.000	-
25-29	0.947	0.239	0.934	0.139
30-34	0.807	0.001	0.792	0.000
35-39	0.646	0.000	0.629	0.000
40-44	0.284	0.000	0.275	0.000
45-49	0.080	0.000	0.078	0.000
Marital duration	0.941	0.000	0.939	0.000
First year of marriage	0.028	0.000	0.028	0.000
Birth in *t*-1	0.309	0.000	0.298	0.000
Urban	0.839	0.012	0.785	0.004
Period:				
1955	0.324	0.000	0.306	0.000
1956	0.679	0.001	0.657	0.000
1957	0.651	0.000	0.635	0.000
1958	0.689	0.000	0.674	0.000
1959	0.867	0.164	0.859	0.137
1960-64	1.000	-	1.000	-
1965	1.031	0.726	1.039	0.668
1966	0.999	0.991	1.004	0.967
1967	0.872	0.104	0.879	0.125
1968	0.878	0.124	0.890	0.171
1969	0.878	0.123	0.897	0.202
1970	0.855	0.061	0.879	0.125
1971	0.830	0.022	0.855	0.058
1972	0.886	0.126	0.919	0.294
Period × urban:				
1955	1.292	0.140	1.291	0.142
1956	1.198	0.308	1.179	0.355
1957	1.244	0.213	1.220	0.263
1958	1.591	0.004	1.578	0.005
1959	1.099	0.556	1.102	0.549
1960-64	1.000	-	1.000	-
1965	1.057	0.699	1.068	0.644
1966	1.072	0.614	1.106	0.470
1967	0.832	0.172	0.856	0.252
1968	0.756	0.038	0.771	0.055
1969	0.819	0.132	0.843	0.198
1970	0.966	0.795	1.004	0.978
1971	0.795	0.073	0.833	0.157
1972	0.686	0.003	0.717	0.008
Religious			0.850	0.007
Urban religious			1.251	0.013
Woman studied ≥ 8 years			0.743	0.000
Infant death (*t*-1)			2.214	0.000
Intercept	3.429	0.000	3.907	0.000
S. D. random effect	0.691	0.000	0.674	0.000
-2Log likelihood				
Initial	32,574.093		32,574.093	
Final	28,331.505		28,242.178	

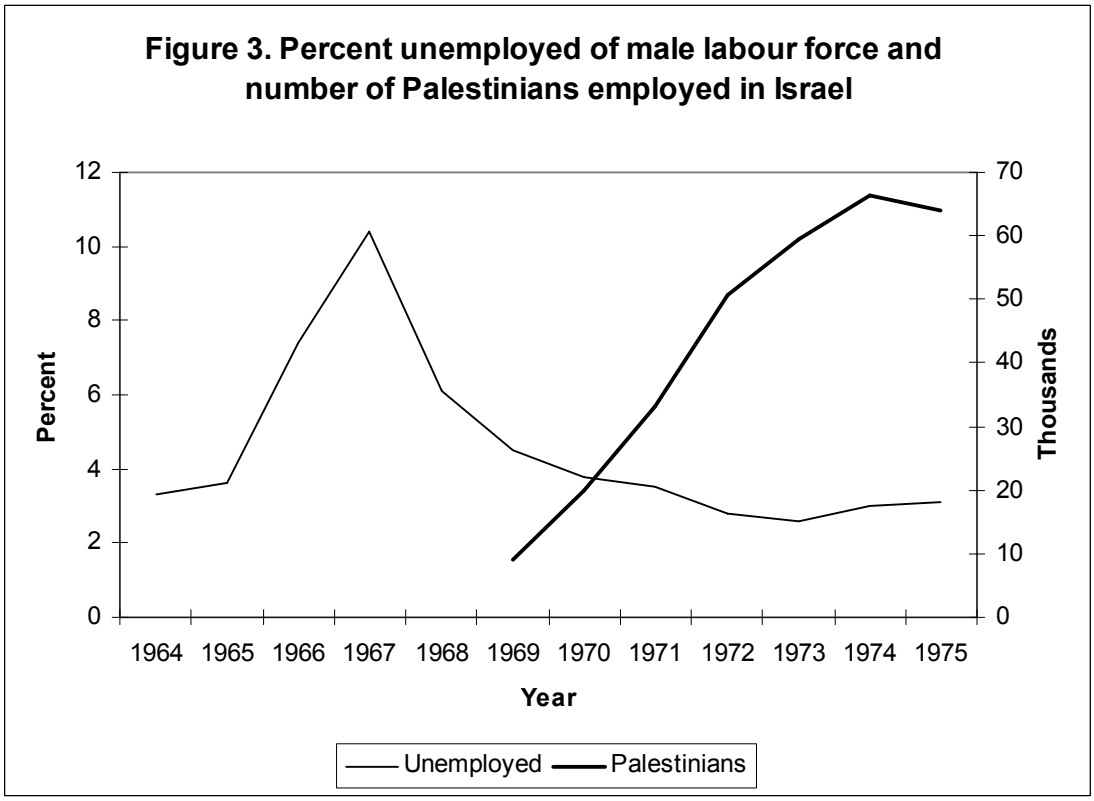


Note: Computations of Coale's marital fertility index for women, who were in their first marriage at the time of the Census, were done using the own-children method. The data for 1955-65 are based on the 1972 Census, while those for 1966-82 are based on the 1983 Census. Many villages changed their status to urban settlement in the period 1972-1983. In order to preserve comparability, urban settlements with less than 10,000 inhabitants in 1983 have been defined as rural.

Figure 2. Total fertility rate and infant mortality rate among Israeli Muslims 1955-95

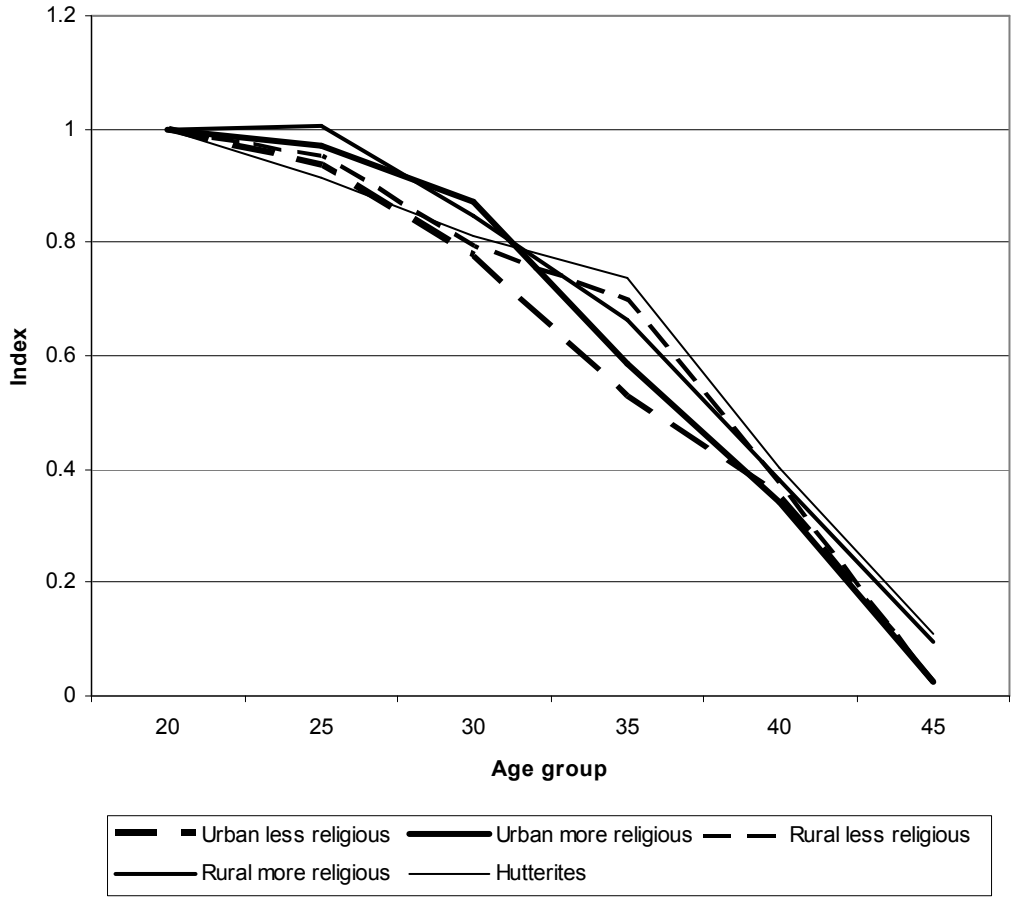


Source: Statistical Abstracts of Israel



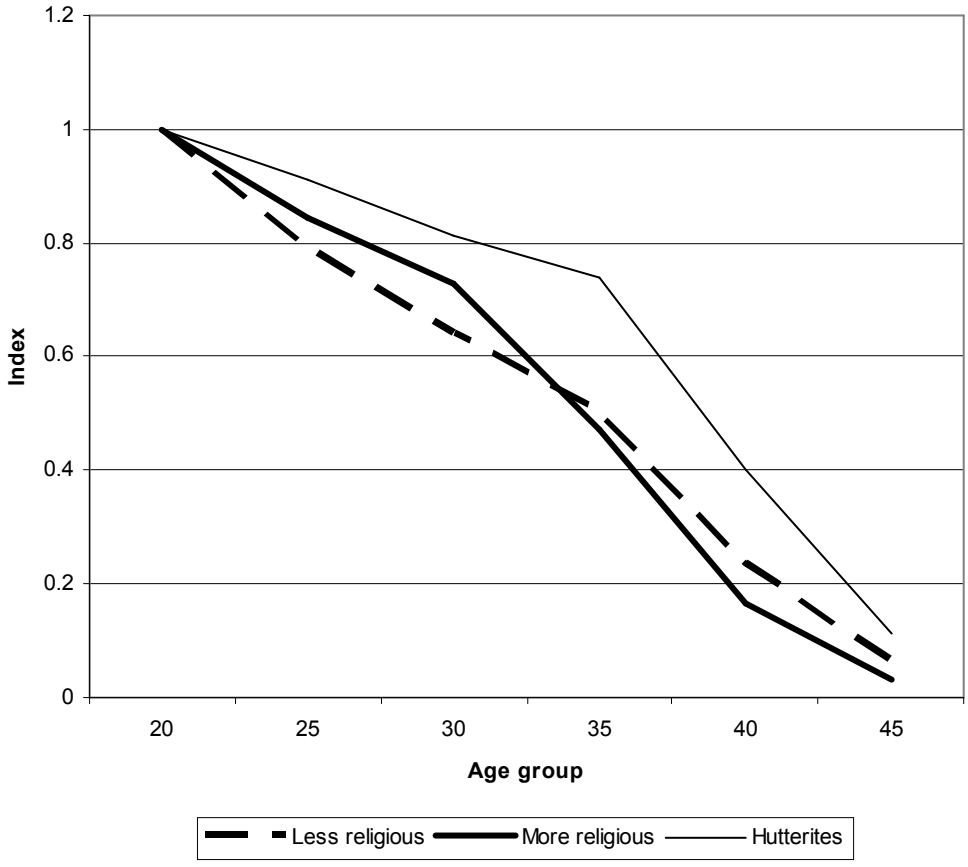
Source: Statistical Abstracts of Israel

Figure 4. Indexed marital fertiliy rates by religiosity and urban/rural residence before the transition



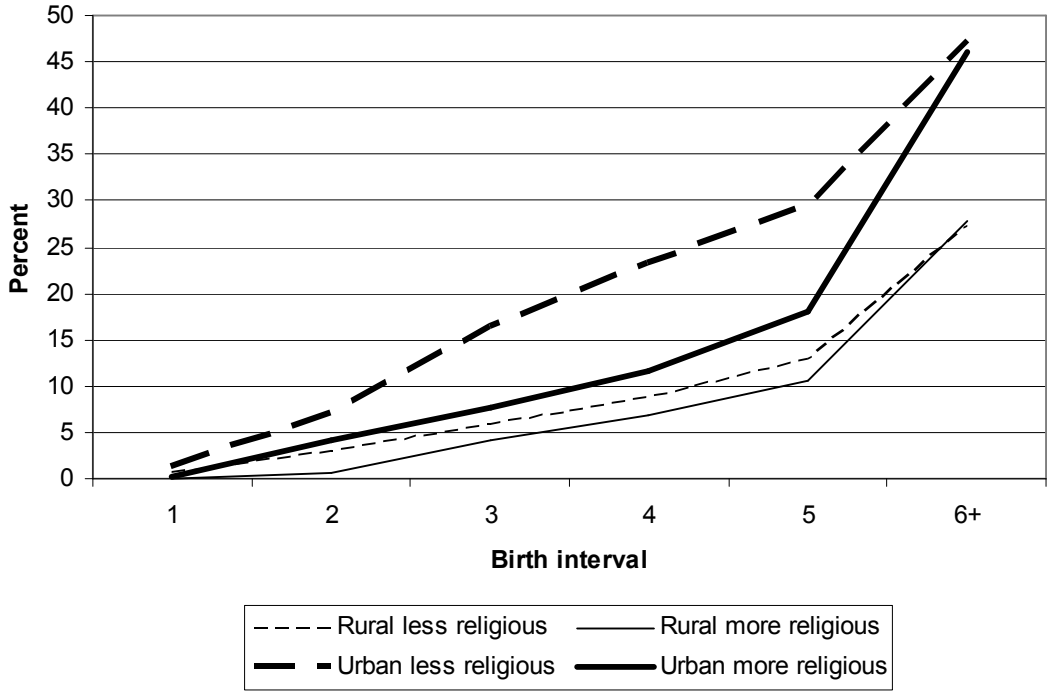
Source: IFS

Figure 5. Indexed marital fertility rates by religiosity in urban areas, 1967-72

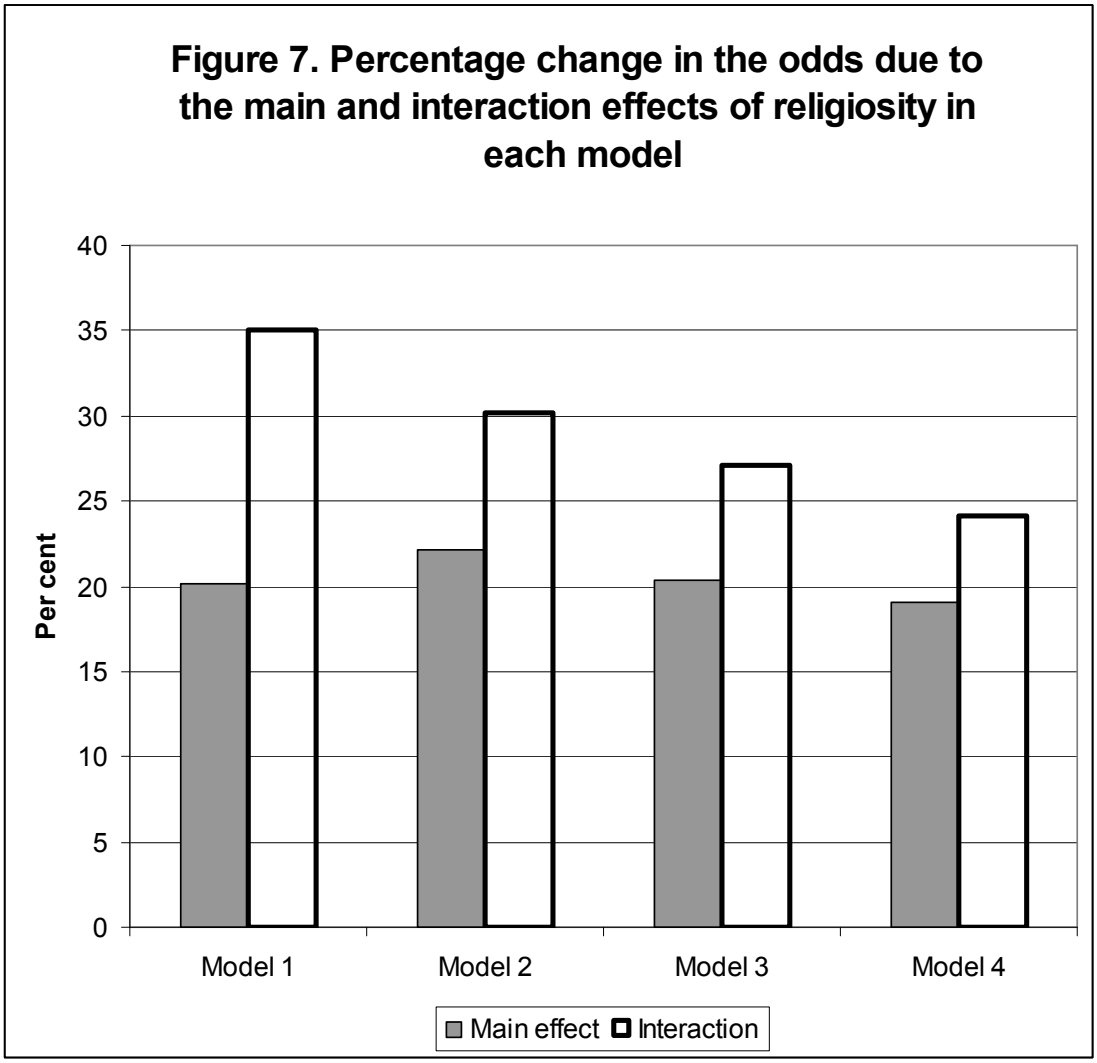


Source: IFS

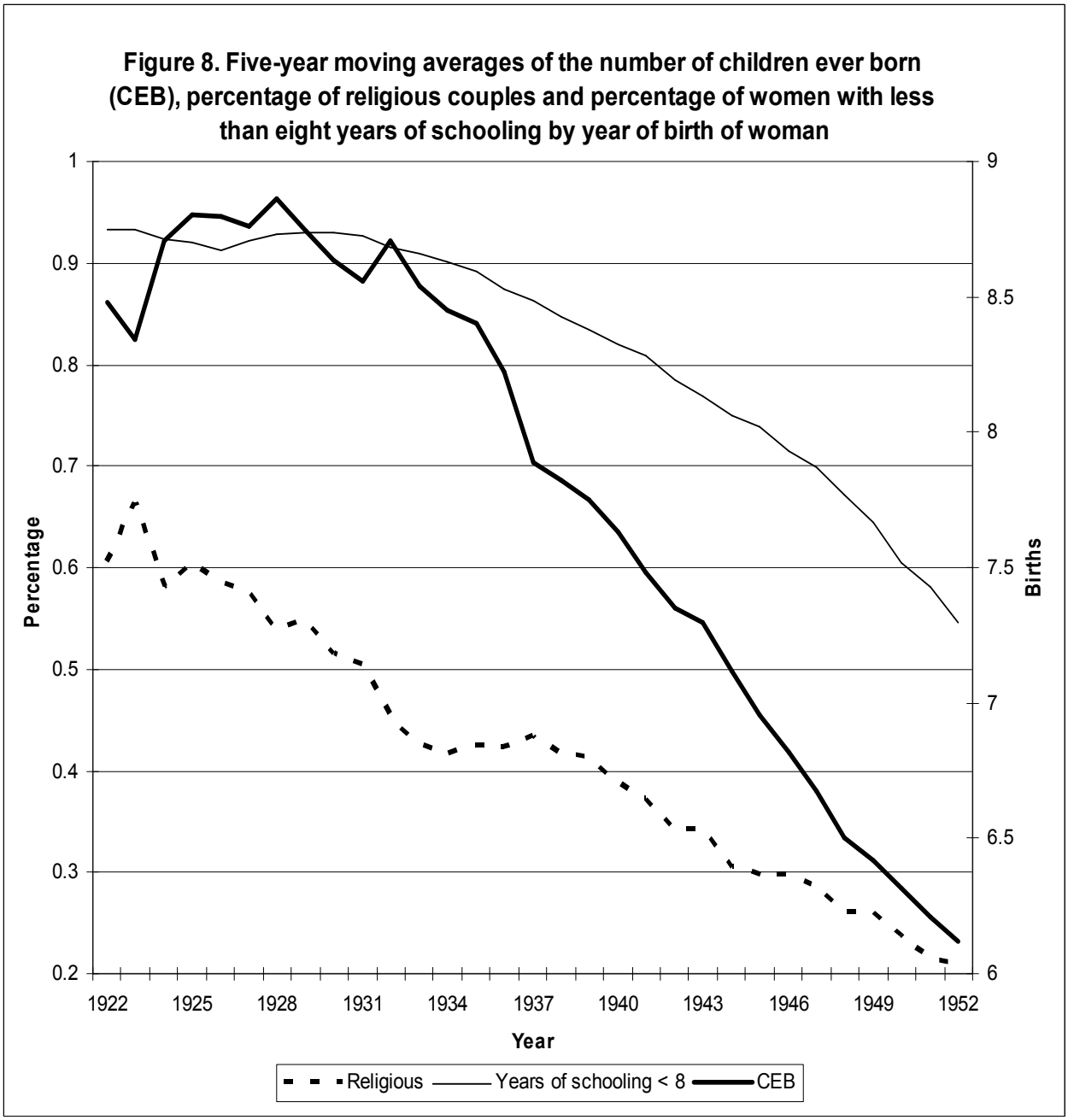
Figure 6. Cumulative percentage of couples using contraceptive methods by birth interval, religiosity and rural/urban residence



Source: IFS

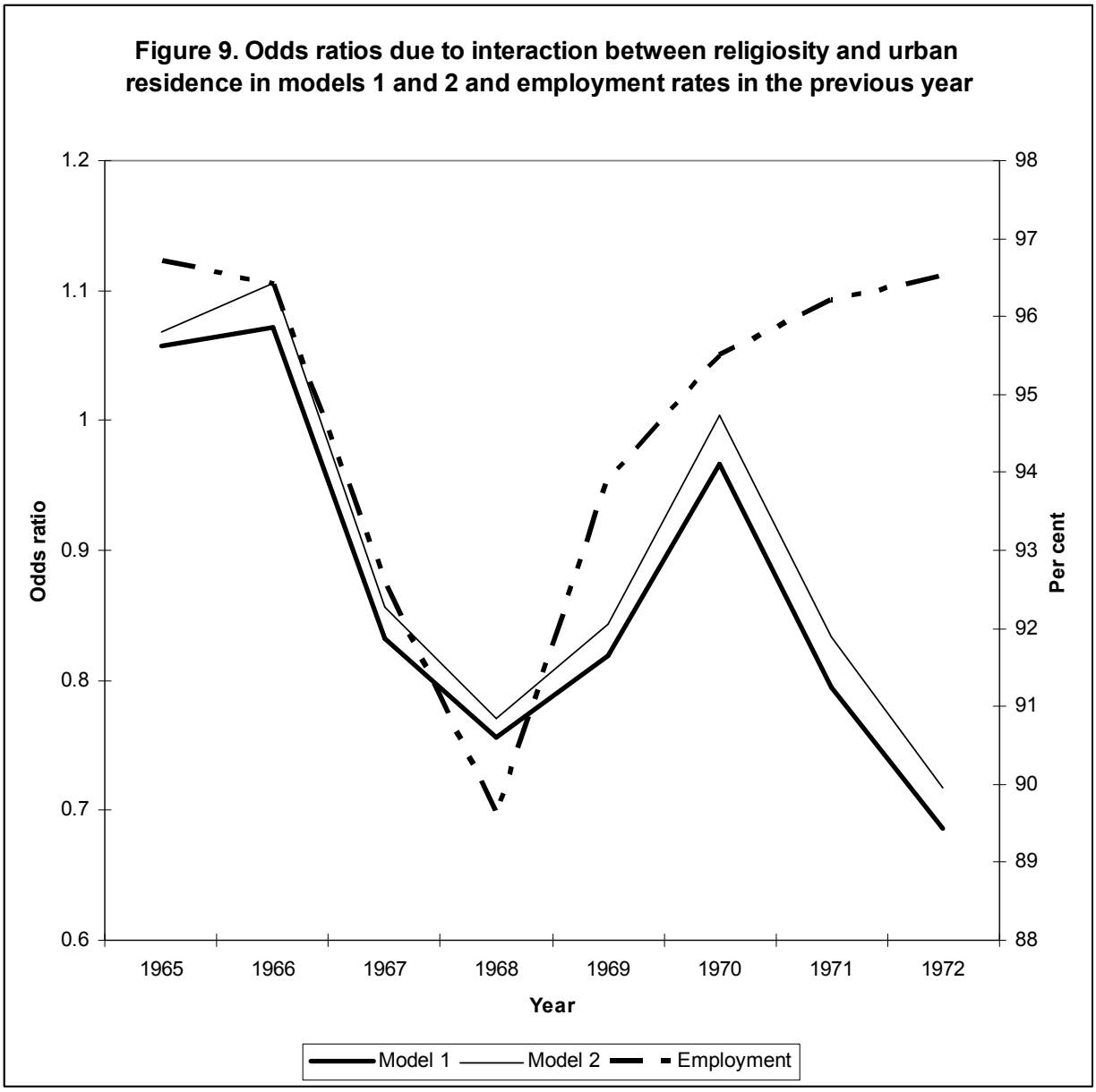


Source: Table 4.



Source: The number of children ever born and level of education were computed from the 1995 Census; the percentage of religious couples was computed from the IFS.

Figure 9. Odds ratios due to interaction between religiosity and urban residence in models 1 and 2 and employment rates in the previous year



Source: Table 5 and Statistical Abstracts of Israel.