

NBER WORKING PAPER SERIES

SECT, SUBSIDY, AND SACRIFICE:
AN ECONOMIST'S VIEW OF
ULTRA-ORTHODOX JEWS

Eli Berman

Working Paper 6715
<http://www.nber.org/papers/w6715>

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 1998

This paper continues joint work with Ruth Klinov, whom I thank for her insight. The Jerusalem Institute for Israel Studies provided financial support. The Falk Institute supported an earlier study. Menachem Friedman and Larry Iannaccone have been tireless sources of knowledge and inspiration. I acknowledge the helpful comments of Edward Glaeser, two anonymous referees, David Boxenhorn, Carmel Chiswick, Momi Dahan, Maggie Eisenstaedt, Elhanan Helpman, Shulamit Kahn, Kevin Lang, Joshua Levisohn, Linda Oz, Joel Perlmann, Michael Marino, James Rebitzer, Jacob Rosenberg, Shlomo Sternberg, Shlomo Yitzhaki, Joseph Zeira and seminar participants at many institutions. Data from the Israel Central Bureau of Statistics were efficiently provided by the Social Sciences Data Archive at the Hebrew University, Jerusalem, through an arrangement with the Falk Institute. I thank Zaur Rzakhanov for research assistance. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

© 1998 by Eli Berman. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

Sect, Subsidy, and Sacrifice: An Economist's
View of Ultra-Orthodox Jews
Eli Berman
NBER Working Paper No. 6715
August 1998
JEL No. D6, D8, H2, I3, J1, J2, N35, O17

ABSTRACT

Israeli Ultra-Orthodox men study full-time in yeshiva till age 40 on average. Why do fathers with families in poverty choose yeshiva over work? Draft deferments subsidize yeshiva attendance, yet attendance typically continues long after exemption. Fertility rates are high (TFR=7.6) and rising. A social interaction approach explains these anomalies. Yeshiva attendance signals commitment to the community, which provides mutual insurance to members. Prohibitions strengthen communities by effectively taxing real wages, inducing high fertility. Historically, the incursion of markets into traditional communities produces Ultra-Orthodoxy. Subsidies induce dramatic reductions in labor supply and unparalleled increases in fertility, illustrating extreme responses social groups may have to interventions.

Eli Berman
Department of Economics
Boston University
270 Bay State Road
Boston, MA 02215
and NBER
eli@bu.edu

Twelfth century philosopher Rav Moses Maimonides explaining circumcision..

“It gives to all members of the same faith, i.e., to all believers in the Unity of God, a common bodily sign, so that it is impossible for any one that is a stranger, to say that he belongs to them. *For sometimes people say so for the purpose of obtaining some advantage ...*It is also a fact that there is much *mutual love and assistance* among people that are united by the same sign when they consider it as [the symbol of] a covenant.

[The Guide for the Perplexed, late 12th century, translated 1904. Chapter XLIX. Brackets are those of the translator. Italics are my own.]

I. INTRODUCTION

Economists have recently gained useful insights into social behavior using “social interaction” models, which extend traditional rational choice by including the actions of other agents directly in the objective function of individuals. These methods have allowed economists to progress in the analysis of interactions in fields traditionally reserved for sociologists.¹

Religious sects pose a unique challenge to this agenda. These groups stubbornly defy price theory, persisting in time-intensive activities like communal worship, sabbath observance and dietary restrictions despite the increased shadow price of time. Yet, such groups show no sign of disappearing and those with the most demanding practices seem to be growing fastest.² Ultra-Orthodox³ Jewry, the modern Anabaptist traditions (such as the Amish, Mennonites and Hutterites) and Radical Islam are thriving, despite a multitude of time intensive requirements.

Ultra-Orthodoxy was born as a rejection of the Western Liberal tradition, the intellectual antecedent of rational choice theory. Its world view often stresses divine inspiration and sometimes mysticism as criteria for making choices. It often judges actions by their intent, in contrast to the consequentialist approach of rational choice theory. The *choices* made by Ultra-Orthodox Jews pose a challenge for economists,⁴ as religious activity often involves voluntarily limiting options and destroying resources. Following Iannaccone [1992], I rationalize this behavior, applying a particular form of social interaction models to this problem, the club good⁵ approach. In clubs, the actions of other members appear in each-others’ objective functions but externalities flowing from those actions are excludable, applying only to club members. This is an accurate description of religious communities, as members benefit from the religious and social activity of other club members through a process not mediated by prices. Those benefits have a price, though, as an efficient club seeks to influence the activities of members by requiring them to submit to prohibitions and sacrifices. This approach to religious behavior as a social activity does

¹ Examples include segregation [Schelling 1971; Becker and Murphy 2000], discrimination [Loury 1977], peer pressure in firms [Kandel and Lazear 1992], ethnic trading groups [Greif 1994] and criminal gangs [Glaeser, Sacerdote and Scheinkman 1996]. For a survey of the social interaction literature and its relationship with Sociology, see Weber [1978], Akerlof [1997] or Becker and Murphy [2000].

² Iannaccone [1998] describes the growth of conservative sects including the rise of radical Islam (p. 1471).

³ Members prefer the term Orthodox, which is also claimed by the less traditional “Modern” Orthodox, or the Hebrew term *Haredi*, which means trembling, or (God)-fearing. They also refer to themselves simply as *Yidn*. See Heilman [1992, pp. 11-14] for a discussion.

⁴ Smith [1776] discusses religion using an approach based on individual incentives. Azzi and Ehrenberg [1975] revived that approach introducing a return in the hereafter as a rationalization for time spent in religious activity. For a survey see Iannaccone [1998].

⁵ See Cornes and Sandler [1986] for a clear explication of club good theory.

not deny the importance of faith but attempts to provide a positive theory emphasizing the mutual insurance aspect of life in religious communities.⁶

This paper has one major theme: The conventional rational choice model, augmented with social interactions and excludability, can produce extremely large behavioral responses to interventions. Some of these responses are opposite to the predictions of conventional microeconomics (in which only one's own actions and market prices are arguments in an objective function). Understanding the intensity and direction of these responses provides an economic explanation for several puzzling behaviors among Ultra-Orthodox Jews.

Israel's Ultra-Orthodox Jews are a fascinating and fast-growing sect which has held virtual veto power over public policy for more than two decades. They represent a unique research opportunity, since unlike gangs, cliques, and other groups defined by social interactions, Israeli Ultra-Orthodox Jews are reliably identified in standard survey data.

The Ultra-Orthodox pose three puzzles for a social scientist. First, their historical increase in the stringency of religious practice represents a paradox. Ultra-Orthodoxy developed and thrived in the 19th century, during the economic emancipation of European Jews. While most Jews responded to the accompanying increase in real wages by reducing their adherence to time-intensive traditional practices, the Ultra-Orthodox developed a more stringent and *more time-intensive* form of Judaism. That trend is currently being repeated, as religious practice again becomes increasingly stringent and time-consuming from generation to generation.

Ultra-Orthodox fertility rates are the second puzzle. Fertility is high, at 6.5 children per Israeli Ultra-Orthodox woman in the early 1980s. It is also *rising*, reaching 7.6 children per woman by the mid 1990s. This community is dramatically reversing the fertility transition, a rarity in modern demographics.

Finally, the labor supply of Ultra-Orthodox men is low and falling. By the mid 1990s labor force participation among Israeli Ultra-Orthodox men had dropped to one-third. They remained out of the labor force on average till age 40 in order to study full time in yeshiva, religious seminaries which provide almost no practical training.

In the face of poverty among their families, why do men remain in yeshiva so long? Part of the explanation must be draft deferments, which effectively subsidize yeshiva attendance. Yet, yeshiva attendance typically continues long after the deferment subsidy has run out, a finding inconsistent with price theory. Nor can the entire explanation simply be a preference for studying the holy texts. Ultra-Orthodox men outside of Israel, followers of the same denominations, rarely remain in full time yeshiva attendance beyond age 25.

I offer an explanation for all three puzzles based on a club good model. Club members benefit from access to a remarkably generous mutual insurance network based on religiously motivated charitable acts. Mutual acts of charity provide the social interaction nature of the

⁶ Glaeser and Glendon [1997] provide evidence supporting this social approach to religion, showing that church attendance in the U.S. is predicted by the local attendance of people with similar educational levels.

model. Access to mutual insurance is excludable, making it a club good. Religious prohibitions can be understood as an extreme tax on secular activity outside the club which substitutes for charitable activity within the club. A religious community lacking tax authority or unable to sufficiently subsidize charitable activity may choose prohibitions to increase this activity among members. Sabbath observance and dietary restrictions, for instance, can be rationalized with that approach. In this context the increased stringency of religious practice is an efficient communal response to rising real wages and to increased external subsidies.

Increased fertility can be explained as an interaction of efficient prohibitions and increased subsidies. As subsidies increase the value of community services offered to members, a club concerned with attrition can afford to impose higher effective taxes through prohibitions. Thus subsidies reduce real wages, causing women to reduce market activity in favor of household activity, particularly childbearing. This “subsidized prohibition” mechanism runs Becker’s fertility transition argument in reverse. I test this explanation using Sephardi/Ashkenazi variation in subsidies over time, revealing a remarkable differential increase in fertility. *Sephardi Ultra-Orthodox women, who enjoy a larger increase in subsidies, increase their fertility by fully two and a half children, over the 15-year sample period, while Ashkenazi Ultra-Orthodox women increase their fertility by (only) one child.*

Rationalizing yeshiva attendance till age forty requires an economic explanation for sacrifices, since years spent in yeshiva could be spent accumulating valuable human capital. I introduce heterogeneous agents who signal their commitment to the religious club by incurring costs or “sacrificing,” allowing the club to exclude free-riders, choosing only the most committed among potential entrants. Yeshiva attendance signals commitment to the Ultra-Orthodox community, or club. This approach explains how labor supply is drastically distorted by subsidies to community members, since subsidies induce larger, more wasteful signals of commitment. This mechanism is labeled “subsidized sacrifice.”

I argue that the club good approach offers a unified explanation for all three puzzles, while conventional price theory cannot, even when amplified by “social multipliers” [Becker and Murphy 2000]. As a prelude to that discussion consider two findings at odds with price theory. First, yeshiva attendance typically persists for five years after the draft deferment subsidy typically expires at age 35, while price theory predicts a sharp decline in yeshiva attendance at age 35. Second, religious observance became more time-demanding as the shadow value of time increased. Price theory predicts a reduction in the time-intensity of religious observance. Other explanations are considered and largely rejected in the discussion below.

Public policy toward clubs may have severe welfare implications. The sharp increases in both nonemployment and fertility illustrate that subsidized sacrifices and prohibitions can induce extreme responses. Intuitively, subsidizing a signal is inherently wasteful as it erodes signaling value, inducing a more costly signal. More generally, subsidizing any aspect of membership in a club with a costly signal as an entry requirement induces a more expensive signal which dissipates the initial subsidy. Equitable policy is efficient in the sense that public policy induces an inefficient increase in the costly signal only when it favors club members over nonmembers. The fertility increase is the result of a second mechanism by which subsidies allow clubs to increase the

stringency of distorting prohibitions, or norms. Here as well, I show that public policy is distortionary because it is discriminatory.

Section II provides background on the Israeli Ultra-Orthodox, describes the puzzle of low employment rates and discusses several alternative explanations for that puzzle. Section III develops an explanation based on a club good approach. Section IV applies the same analysis to two additional puzzles, the paradoxical birth of Ultra-Orthodoxy and rising fertility. Section V discusses the implications for welfare dependence among Israeli Ultra-Orthodox Jews. Section VI concludes, discussing possible generalizations to other ethnic and religious groups and the potential for extreme responses to intervention among gangs, cliques and other social groups.

II. BACKGROUND: ULTRA-ORTHODOXY AND YESHIVA STUDY

Ultra-Orthodox Judaism is a highly ritualistic form of observance about two centuries old.⁷ Its spread dates back to the beginnings of European Jewish assimilation into secular society, in the late eighteenth century. Ultra-Orthodox Jews today practice a tradition which preserves to a remarkable degree the lifestyle of their villages (*shtetlts*) in central and eastern Europe in the 19th century. The men are bearded, wearing long black formal overcoats and black wide-brimmed hats. The women dress modestly, with only faces and hands visible, the hair of married women covered by wigs. Prohibitions which Jews have traditionally observed, such as dietary restrictions, sabbath observance and sexual propriety are augmented by the Ultra-Orthodox. For example, unlike Orthodox Jews, some Ultra-Orthodox refuse to use a delineated area (*Eruv*) which allows one to carry objects on the sabbath, geographically limiting the size of a synagogue-based community. Moreover, many traditions in use of language, diet, clothing and synagogue practice are elevated to the status of religious imperatives among the Ultra-Orthodox. Deviations can result in ostracism. Thus, the customs of 19th century eastern European Jewry are currently preserved quite precisely in New York and Israel. Yet despite the conservative appearance of the culture, Jewish Ultra-Orthodoxy is radically more stringent in its demands than traditional European Jewry and less tolerant of deviation.⁸ One aspect of this increased stringency is the segregationist nature of Ultra-Orthodoxy, which broke a longstanding tradition of unity within Jewish communities. By making it difficult to eat with, and unacceptable to worship with Reform or even Orthodox Jews,

⁷ The origins of Jewish Ultra-Orthodoxy are well described in Friedman [1991], Heilman [1992], Katz [1961] and Silber [1992].

⁸ “Of all the branches of modern-day Judaism, ultra-Orthodoxy is undoubtedly the most tradition-oriented. Its rallying cry is “All innovation is prohibited by the Torah!” a clever wordplay on a Talmudic ruling first coined by Rabbi Moses Sofer in the early nineteenth century that captures the essence of its conservative ideology. And yet, like other antimodern conservative movements, ultra-Orthodoxy is clearly a recent phenomenon. Belying the conventional wisdom of both its adherents and its opponents, it is in fact not an unchanged and unchanging remnant of pre-modern, traditional Jewish society, but as much a child of modernity as any of its “modern” rivals.” Silber [1992, p. 23].

including relatives, the Ultra-Orthodox consciously reduce social contact between themselves and the rest of the Jewish community.

Ultra-Orthodoxy contains numerous subcommunities with a wide array of practice and belief. For instance, *Lubavitch* Hassidim are openly messianic (some believed their last leader to be the Messiah), while other Hassidim and *Misnagdim* (or “Lithuanians”) are not. Most are hierarchical communities that seek the advice of their leader, either Rebbe or *Rosh yeshiva*, on any decision, religious or secular. Like other sects, such as Mennonites, Amish, and radical Islam, Ultra-Orthodox Jews reject almost all of modern culture, which they view as corrupt and corrupting. That rejection includes modern literature, sport, music, film and television.

Mutual Insurance

The degree of mutual insurance practiced within these communities today probably surpasses that of a traditional Indian village [Townsend 1994], and is believed to be unprecedented in Jewish history.⁹ No sick member is without visitors and no single member is without an arranged match. For example, Landau [1993] reports on tens of in-kind free loans advertised in flyers by neighborhood rabbis in the *Bayit Vegan* neighborhood of Jerusalem, ranging from Torah scrolls to wedding gowns to playpens. The same flyers list free services available, including visits to the sick, logistic support and advice for mourners, and frozen meals for the sick, for the elderly and for mothers after childbirth. The flyers include a request to donate time and money, but also to identify anyone needing help. Most recipients and all volunteers and contributors are Ultra-Orthodox. Landau [1993] also describes a well organized system of money-raising for emergency medical expenses not covered by regular medical insurance, as well as a decentralized system of voluntary donation and solicitation for individual hardship cases. All these charities, including individual cases, are endorsed by a leading rabbi. “The Rabbis' signatures attest to the veracity of the information.” [Landau 1993, p.262].

Charity is ubiquitous and interest-free loans abound, both in money and in kind:

“..just as `Torah' is not a select or elitist pursuit, but embraces the entire community, so too `Charity' does not merely, or even mainly, follow the classical pattern of rich-to-poor assistance. Almost everyone in the Israeli *haredi* [Ultra-Orthodox] world is a recipient of charity, in one form or another. Yet at the same time the *haredim* give charity too, participating in cash or kindness in the cost of this universal Torah-learning.” [Landau 1993, p. 255]

“But the most important money-saver for the *haredim* is money itself: the availability of countless free-loan [funds].. .. where one can borrow hundreds, and in some cases thousands of dollars without interest. ..the administrators are all volunteers; there are no office expenses since there are no offices; and hence the only overheads are bad debts - of which there are remarkably few.” [Landau 1993, p. 259]

⁹ Menachem Friedman, quoted in Landau [1993], p. 255.

How can a community solve the principal-agent problems associated with such generous mutual insurance? I return to that question in Section III.

Subsidy

This paper examines the response of Israeli Ultra-Orthodox to subsidies. Understanding subsidies directed at the Israeli community requires a capsule survey of their role in Israeli politics. Ultra-Orthodox political influence is mostly due to their status as a swing voting block in parliament. Ultra-orthodox politicians have been able to credibly threaten to vote with either large block, the right or left, on foreign policy.¹⁰ This status has allowed disproportionate influence in every government since the first right-center coalition was formed in 1977. Influence was translated into a sharp increase in government support to the Ultra-Orthodox community in 1977. Support includes stipends for married men in yeshiva, direct funding of yeshivas, reduced tuition in preschool, elementary school and boarding schools, reduced property taxes and reduced health insurance premiums. Ultra-Orthodox pressure has also helped increase the generosity of various general support systems from which they benefit disproportionately, most notably child allowances, which have become increasingly convex in the number of children.¹¹ The Ultra-Orthodox have pursued a contentious political agenda, attempting to impose religious restrictions through secular law in such areas as dietary restrictions (*kashrut*), sabbath observance and abortion. They have also insisted on an Orthodox definition of Judaism in Israeli civil law. This constitutes an important and emotional issue in Israel and among Jews abroad since Israel's "*Law of Return*" grants any (recognized) Jew citizenship upon arrival.

In 1984 a Sephardi Ultra-Orthodox party organized nationally, partially in reaction to preferential treatment given to Ashkenazi (European) Ultra-Orthodox by the Ashkenazi-dominated institutions and political party.¹² It immediately became the largest Ultra-Orthodox party, drawing votes from traditional Sephardi Jews who had supported non-Ultra-Orthodox parties. It became the fulcrum of Israeli politics and rapidly translated its political leverage into sharp increases in funding of its own system of schools and social welfare institutions.¹³

The most controversial point of contact between the Ultra-Orthodox and secular society in Israel is draft deferments and exemptions granted to full time yeshiva students. Deferment of regular service (three years) and reserve duty (about 30 days annually in the 1980s) can be extended and eventually converted to an exemption by remaining in yeshiva till age 41, or till age 35 with five children [Ilan 1998c]. A cap on the number of exemptions was lifted by the

¹⁰ Ilan [1988a] summarizes a number of studies indicating that the Ultra-Orthodox hold uniformly right-wing views on foreign policy. This did not prevent coalition with the left wing Labour party in the early 1990s and support of the Oslo accords, apparently because foreign policy is considered secondary to domestic religious issues.

¹¹ Ilan [1998b] estimates that an Ultra-Orthodox family with six children is eligible for 6,500 NIS (\$1850) per month in government support from all sources.

¹² Sephardi, which literally means "Spanish," is a common misnomer for Jews from Arab countries.

¹³ Friedman [1991, chapter 11] provides a detailed description of the rise of this political movement.

government in 1977. By 1988 the number of deferments reached 7.5 percent of males newly eligible for the draft. These deferments and exemptions are granted only to full time yeshiva students, who are liable to be drafted if they work even part time.

As subsidies to the community increased, durations of yeshiva attendance lengthened, deepening a serious social welfare problem. Figure I illustrates increased labor force nonparticipation due to yeshiva attendance. The proportion of prime-aged Ultra-Orthodox men (aged 25-54) not working because of full time yeshiva attendance rose from 41 percent in 1980 to 60 percent by 1996.¹⁴ These levels are *unprecedented* among Jews¹⁵ and far exceed yeshiva attendance abroad, where young men rarely remain past age 25. The combination of increased yeshiva attendance and rapid population growth has resulted in a sharp increase in the number of Israeli children not supported by their father's earnings. The Figure reports that the proportion of Israeli children with a (labor force nonparticipant) father in yeshiva more than doubled between 1980 and 1996, from 2.7 percent to 5.9 percent.

Families with fathers in yeshiva have very low incomes. Table I reports income by source for households with a father (aged 25-54) in yeshiva in the mid 1990s. The average family in this category is large, with 4.5 children at home. Their monthly income in 1995 averaged about \$1150 (US) or 3,463 NIS, or 42 percent of the income of the average two-parent Israeli family¹⁶ (which supports only 2.1 children). Measured income does not include imputed rent for a population that generally owns its own housing. It's worth stressing, though, that the common practice of conditioning marriage on the provision of an apartment by parents exists precisely because young Ultra-Orthodox couples cannot afford to pay rent. The second to last row of panel A reports that the Israeli poverty line in 1995 for a household with 6.6 members was 3,777 NIS. Thus the average family with a prime-aged father in yeshiva lives in poverty.¹⁷

Families with fathers in yeshiva are extremely dependent on government support. Only 18 percent of family income is earned, almost all of that coming from the wife's earnings. Transfers from institutions (other than the National Insurance Institute) account for 39 percent of income. This is almost entirely stipends granted to yeshiva attendants. Child allowances make up another 32 percent. These transfers, mostly from government, account for at least 70 percent of the income of these families, not including pensions, disability and other National Insurance programs.

¹⁴ Yeshiva attendance may be somewhat, but not grossly, exaggerated. A government commission reports that among yeshiva students suspected of violating the deferment agreement, 40 percent in violation, either by working or by simply being in a different yeshiva. The army claims that figure to be 20 percent [Ilan 1998c]. The violation rate in a random sample of yeshiva students is presumably lower.

¹⁵ Friedman [1991] describes the history of yeshiva attendance in central and eastern Europe.

¹⁶ Under-reporting of income would bias estimates downwards. Yeshiva nonparticipants may be more likely to under-report income since, in principle, they face larger potential penalties than do most taxpayers: they could lose both their stipends and draft deferments as well as having to pay taxes. In practice there is evidence that these sanctions are not strictly enforced [Ilan 1998d].

¹⁷ The poverty line is meant to be compared with income net of income taxes, which is even lower than the reported figure.

Comparing panels A and B reveals that, (even if the mysterious residual term in panel B is treated as government support - which is quite likely,) the level of public support per family more than doubled between the early 1980s and the mid 1990s.

Puzzle #1: Why remain in yeshiva so long?

Why do men chose yeshiva over work when their families are in poverty? Consider some conventional explanations, as a prelude to the “club good” approach.

An analysis of *yeshiva as a human capital investment* only amplifies the question. Table II reports estimates of a human capital wage regression in 1979-1982 and 1993-1996. The second column in each panel reports separate coefficients measuring the (market) return to schooling for secular and *yeshiva* education. While the return to secular schooling rose in Israel over the 1980s and early 1990s from 7.8 to 9.4 percent, the return to yeshiva education was low and possibly decreasing, from 2.3 to 1.8 percent. Relative to secular education, which is a remarkably good investment in Israel, yeshiva has become an increasingly poor choice.¹⁸ Yet Ultra-Orthodox men are choosing it in increasing numbers and for longer durations of study. Not only is the choice of yeshiva over work puzzling, so too is the choice of yeshiva over secular education.

The first guess of most Israelis is that high rates of yeshiva attendance are due to *draft deferment* rules, which tax the first hour of work for a yeshiva student with months (if not years) of military service.¹⁹ Yet the data contradict this explanation. If a father were extending yeshiva attendance only to exploit a draft deferral, once an exemption is granted he would leave yeshiva for the labor force. Exemptions are achieved at age 35 for men with at least five children and at age 41 regardless of the number of children. Those critical ages are marked with vertical lines in Figure II, which plots Labor Force nonparticipation due to yeshiva attendance against age. *Not only does yeshiva attendance not disappear at age 41, there is no sharp decline of yeshiva attendance rates at age 35 or 41.* Table III reports that in the early 1990s, fully 46 percent of Ultra-Orthodox men aged 41-45, and 65.5 percent of those aged 35-40 with 5 children, chose yeshiva over work (or workseeking) despite having a draft exemption.

The choice of studies over work is especially puzzling considering the high *marginal utility of income* in a large family.²⁰ A calculation of predicted wages based on estimates from Table II predicts that, at age 35, a yeshiva student could earn more than twice his monthly stipend

¹⁸ The standard caveat about causal interpretation of regression coefficients applies. For instance, if years of *yeshiva* schooling proxy for an unobserved preference for work which allows study during work hours, low wages may reflect a compensating differential and bias the estimated coefficient downward. It seems unlikely that the entire 7.6 percentage point gap between the returns to secular and yeshiva education can be due to such biases.

¹⁹ This was the view of Berman and Klinov [1997], who recommended a change in draft deferment rules for yeshiva study, arguing that the deferment be decoupled from the requirement not to work, either by giving an unconditional exemption to Ultra-Orthodox Jews or by abolishing the exemption. This paper overturns our previous logic, arguing (in Section V below) that an unconditional exemption would lead to increased distortions.

²⁰ Households headed by yeshiva attendants aged 41-45 average 6.4 children at home. Average income for households headed by yeshiva attendants aged 41-45 is 4,536 NIS/month (at 1995 prices) as compared to a poverty line of 5,196 NIS (1993-1996 pooled sample).

by working. That ratio would rise to about 250 percent by age 45 with 10 years of labor market experience. A 25 year old yeshiva student could earn twice the stipend by working, would incur perhaps a month a year of reserve duty till his exemption (generally at age 35), and would gain returns to experience which would increase future earnings. Compounding the puzzle, beginning in their late thirties, a typical Ultra-Orthodox couple will have children marrying. That rarely occurs without the parents guaranteeing minimal financial security by purchasing an apartment for the young couple, since the groom will be in yeshiva and the couple will be too poor to pay rent. Since the two sets of parents typically split the cost of apartments, an Ultra-Orthodox man at age 40 faces the prospect of buying 7 or 8 half-apartments, (at a minimum of \$50,000 per child) over the next two decades.

Could extended yeshiva attendance be due to *preferences*, which is to say the sheer love of learning, or to the unique norms²¹ of the Ultra-Orthodox community? That explanation is inconsistent with the behavior of Ultra-Orthodox in much wealthier communities abroad. In those communities, who are often followers of the same rebbe, men seldom attend yeshiva past their mid-twenties. For example, in the Montreal Hasidic community only 6 percent of men aged 25 or older attend yeshiva full time [Shahar et al 1997]. A taste- or norms-based explanation would also require rapidly changing tastes. Durations of yeshiva study are currently much longer in Israel than they were as recently as the early 1980s (see Figure II) and even those durations were unprecedented among the Ultra-Orthodox in central and eastern Europe [Friedman 1991].²²

Perhaps the puzzle can be solved with a hybrid explanation, involving offer wages and norms? Granted, offer wages for Ultra-Orthodox are probably higher abroad than in Israel, but could they be high enough to explain entry into the labor force 15-20 years earlier? Introducing the subsidy inherent in draft deferments still leaves a puzzle: A thirty six year old Ultra-Orthodox man in Israel already exempt from the draft and soon facing the prospect of raising \$350,000 to pay for apartments chooses to remain in Yeshiva for 5 more years on a \$400 a month stipend, rather earning over twice that amount by working. In contrast, a twenty five year old Ultra-Orthodox man in Montreal, with much smaller obligations, chooses to work. Casual empiricism, combined with a reasonable marginal utility of income, suggest that the difference in wages between Ultra-Orthodox men in Montreal or Brooklyn and those in Israel is much too small to explain the difference in employment rates.

The empirical failure of conventional labor supply theory motivates the club good approach, drawn from the Economics of Religion, in the following section. I examine the testable implications of this approach for the birth of Ultra-Orthodoxy and for fertility in Section IV.

²¹ See Akerlof and Kranton [2000] for an economist's view of social norms and identity.

²² Another possibility is that Ultra-Orthodox men from abroad come to Israel for yeshiva, biasing the comparison. This was important in the early 1980s, when about one quarter of Israeli yeshiva nonparticipants were North American. That proportion dropped to 7 percent by 1995/96, which is too small to significantly bias the comparison. Thus, the increase in yeshiva nonparticipation among Israeli natives is actually understated in Figure I.

III. EFFICIENT PROHIBITIONS AND SACRIFICES

Solving the puzzle of Ultra-Orthodox labor supply requires revisiting another puzzling phenomenon: prohibitions and sacrifices among religious sects. This section reviews Iannaccone's [1992] model of efficient religious prohibitions and sacrifices, then extends it to explain the response of labor supply to subsidies.

Prohibitions and sacrifices are common among religious groups. Prohibitions refer to forbidden behaviors, such as dietary restrictions, sabbath observance, dress codes, head shaving, marital fidelity, restrictions on sexual behavior, or refusal of medical care. Sacrifices, in contrast, involve irreversible acts such as destruction of resources. A biblical example is burnt offerings. In the recent history of European Jewry, a circumcision irreversibly labeled a child as Jewish, an act that might put his life at risk by destroying the option of pretending to be a gentile. A vow of fidelity or abstinence is also a form of sacrifice, since it represents a permanent restriction of activities. Years of volunteer activity required of Mormons can be thought of as a sacrifice of time, especially considering the foregone opportunity to accumulate human capital. Limiting choices and destroying or relinquishing resources is puzzling to an economist, yet people voluntarily join groups which enforce prohibitions and require sacrifices.

A social interaction model offers an explanation for these phenomena. Group members derive utility from time spent in religious activities, R , and from secular goods, S . They also gain utility from group "quality," Q , the average amount of time that other members spend doing R , which is an externality for other members. Formally,

$$(1) \quad U_i = U(S_p, R_p, Q), \quad U_1, U_2, U_3 > 0, \\ \text{for } i = 1 \text{ to } N \text{ members, where } Q = \sum_{j \neq i} \frac{R_j}{N-1}.$$

N is exogenous, for now. For example, praying is much more satisfying the more participants there are, especially when the 10th man arrives to make a prayer quorum (*minyan*). The same is true of studying,²³ observing the Sabbath and other time-intensive activities.²⁴ They are much more enjoyable if the neighbors do them as well.²⁵

Perhaps the most important externalities to religious activity in the Ultra-Orthodox community are from religious acts of charity or mutual aid, which provide mutual insurance. We observe remarkable altruism in donation of both time and money to community charities, which

²³ Heilman [1983] stresses the camaraderie and fraternal aspects of informal study groups, or *lernen*.

²⁴ On the time intensity of Jewish religious observances, see Chiswick [1995]. She discusses efforts by the Conservative, Reform and Reconstructionist movements in the U.S. to create time-efficient Jewish experiences to accommodate the increasing shadow price of time among Jews.

²⁵ This interactive structure is common to many empirical applications. For example, Landers et al [1996] find evidence of signalling behavior through choice of hours in law firms with revenue sharing among partners.

provide insurance to community members in the form of job search, spouse search, and transfers of food, clothing, medical services and money. (Jewish law requires a minimum donation of 10% of income to charity, though the donation of time is probably more valuable for the Ultra-Orthodox. This analysis emphasizes the importance of time-intensive charity in group quality and omits charitable donations from Q for simplicity.)²⁶

Community members gain insurance from charitable acts of others in times of need. These are nonmarket transactions, in the sense that they are not mediated by prices. These acts are often unobserved, (anonymous charity is traditionally most esteemed,) which would frustrate the organization of a market mechanism. This logic should be familiar to observers of other groups in which members benefit from the (sometimes unobservable) actions of others, such as families, workplaces, University departments, *kibbutzim*, teams in sport and military units.²⁷

All these examples of externalities, particularly mutual insurance, are excludable. That is, they can be limited to club members. This property distinguishes a club good from a general social interaction model, a distinction that becomes important below.

Members maximize utility subject to time and budget constraints. An allocation of time, T , is split between religious activity, R , and work hours, H . Income is earned at wage rate w and entirely spent on consumption of the secular good S , at price p . In a competitive equilibrium religious activity will be inefficiently low, as individuals ignore the benefits of their activities to others, as illustrated in Figure III.²⁸ The labor supply curve to the right indicates the competitive equilibrium choice of work hours, $H=T-R$, at the wage w/p . The curve to the left indicates the efficient labor supply schedule that a social planner would choose. She would prefer less work and more religious activity (at R^*).²⁹

Efficient Prohibition

Welfare of group members can be improved by increasing the average level of R , either by subsidizing it or by taxing the alternative use of time, H . Religious groups often encourage R with

²⁶ Mutual insurance may explain the attraction of sects more generally in an economy with growing inequities. In a sample of developed countries in the 1980s, Gottschalk and Joyce [1998] find income inequality in Israel to be second only to that in the United States.

²⁷ Ben-Porath [1980] approaches Sociology with a similar broad definition of nonmarket exchange.

²⁸ Formally, the full income budget constraint is $wT = pS_i + wR_i$ and the social welfare optimum is given by R^* in

$$\frac{w}{p} = \frac{U_2}{U_1} + \frac{U_3}{U_1} = MRS_{RS}(R^*) + MRS_{QS}(R^*).$$

where the two terms are the marginal rates of substitution between religious activity and consumption and between group quality and consumption, respectively. The competitive equilibrium choice of R ignores this last term.

²⁹ Group quality, Q , serves to amplify the labor supply elasticity in the upward sloping segment of the labor supply (Figure III) if R and Q are complements. A change in wages has both the conventional direct effect on leisure (hours worked) and an indirect effect in the same direction through its effect on Q (which is just R in a symmetric Nash equilibrium.). This is the “social multiplier” effect emphasized by Becker and Murphy [2000].

eternal promises and the respect of one's peers. Yet R may be hard to subsidize if it is unobservable, like anonymous charity. Alternatively, consider a community that can literally control the price level faced by members through a tax. To achieve the social welfare optimum they would lower the real wage by imposing a tax $\tau = p^* - p$, which induces a choice of $R^* > R$.

A group without tax authority could impose and enforce *prohibitions* on types of secular consumption, thus inducing members to work less and spend more time at religious activities. Religious prohibitions can be understood as extreme but enforceable forms of taxation on secular activity. These may make all club members better off. More generally, contact with the secular world substitutes for club activities. Thus prohibitions that limit these contacts induce members to spend more time in religious and other club activities that have positive externalities. Exclusion from access to insurance or to other club services is a viable form of enforcement.³⁰

This logic provides a rationalization for many forms of religious prohibition. For example, Sabbath restrictions induce members to spend time together on the Sabbath, dietary restrictions decrease the ability of group members to socialize with nonmembers,³¹ and so forth. This also explains the use of dress codes, which aid enforcement by making community members readily identifiable. As in the military, being caught out of uniform triggers sanctions.

Groups that place many restrictions on secular activities are often termed "sects" by sociologists [Weber 1946]. Adam Smith [1776], in his chapter on Church and State, uses that term to describe 18th century Christian sects. He proposed that secular "gaiety" be subsidized in order to undermine the influence of sects with "disagreeably strict" moral codes. Smith could just as well have been describing the birth of Ultra-Orthodoxy in the late 18th century, as described in Section IV below.

An efficient club may attempt to reduce enforcement costs by lobbying the government to apply the appropriate restrictions, even extending them to the entire population. For instance the Ultra-Orthodox in Israel have pursued legal methods to a) restrict retail trade and even travel on the Sabbath; b) enforce dietary restrictions; c) outlaw civil marriage and d) not recognize conversions conducted by other Jewish religious streams under the *Law of Return*. Of course, nonmembers (the non-Ultra Orthodox community) will object to taxes on S as they do not benefit from the induced increase in club quality.

The induced friction between club members and nonmembers resulting from a political agenda, for instance, may cause antagonism towards club members. An interesting implication is that *secular antagonism toward the Ultra-Orthodox could be desirable and efficient for that community* if it discourages secular activity by club members. Antagonism provides another

³⁰ Kandel and Lazear [1992] analyze peer pressure as an enforcement mechanism in firms where workers effort have external effects on the productivity of others.

³¹ That insight is not new. Hyman [1992] cites a French review of Jewish village life published in 1852, "how [can we] combine together *prescriptions that had as their goal the prevention of and mixing of the races* with the sentiments of fraternity necessary vis-a-vis fellow countrymen and non-Jewish friends?" [Archive israélites 13 (1852): 228, italics my own.]

mechanism by which higher levels of religious activity are induced by taxing secular alternatives. *In that sense this is a theory of efficient intolerance.* Efficient mutual antagonism between two clubs is an immediate extension.³²

Efficient Sacrifice

Sacrifices (irreversible acts like circumcision, burnt offerings, and donation of time) cannot be explained as efficient prohibitions with the logic above, since they don't tax a secular good. They *can* be explained as a sort of initiation rite which signals unobserved type [Camerer 1988].

Applying a simplified form of Iannaccone's [1992] model, I introduce unobserved heterogeneity by having high wage (type 2) and low wage (type 1) individuals. High wage individuals choose less religious activity as it is relatively more expensive for them, i.e., $R^2 < R^1$. (Heterogeneity could alternatively be in preference for religious activities at the margin. Heterogeneity in wages is chosen only to simplify the exposition.)

High wage - low R individuals would like to join the high R club and benefit from their high average level of religious activity ($Q^1 = R^1$). Members of the high R (low wage) club would rather not admit the high wage types, as the reduction in the average level of religious activity will reduce club quality. Since access to the externality is excludable, the high R (low wage) group can solve this free rider problem by organizing a club with a costly initiation rite, or sacrifice, which will successfully exclude low R (high wage) individuals from joining, keeping Q^1 high, at R^1 . Unlike R, the sacrifice benefits no-one except through its role as a signal. Though type is unobserved, a well-designed initiation rite will force individuals to signal their type by their willingness to sacrifice time.

Figure IV illustrates the imposition of an efficient sacrifice of time and the resulting increase in utility for the low wage club.³³ (For a formal derivation see Appendix 1.) The horizontal axis shows the allocation of time between work hours, religious activity and sacrifice. The vertical axis measures utility. The two higher curves represent the utility of high wage types and the two lower curves the utility of low wage types. High wage types in a low Q (Q^2) environment choose point A2. Low wage types in a low Q (Q^2) environment choose A1 at a higher level of R than high wage types. Low wage types improve their outcome by establishing a club which admits only members who sacrifice an amount of time κ^* . By excluding high wage types they achieve the higher level of utility at B1, where the sacrifice of time is more than compensated by higher quality ($Q = Q^1$). A sacrifice inducing only low wage types to sacrifice is a separating equilibrium. The efficient sacrifice is the smallest κ that induces separation, leaving high wage types indifferent between high Q and sacrifice (B2), and low Q without sacrifice (A2).

The low wage, high R group is better off with the institution of a sacrifice and will accept anyone who makes the sacrifice into the group, since a sacrifice reliably signals a high level of religious activity. This setup is analogous to other forms of costly sacrifices which signal type,

³² Of course, mutual antagonism may not be desirable for unaffiliated bystanders.

³³ Figures IV and V are constructed by simulation using the function $U(S,R,Q) = [S^\beta + (R^\alpha Q^{(1-\alpha)})^\beta]^{1/\beta}$.

such as initiation rites in the military, hazing in fraternities, Spence signaling in schooling, or frivolous engagement gifts [Camerer 1988].

Subsidy and Sacrifice

In the presence of sacrifice, a subsidy to the club is largely wasted as it induces a larger sacrifice, further distorting labor supply. Figure V illustrates this amplified distortion. The unsubsidized separating equilibrium is described by points A2 and B1 (as in Figure IV). A subsidy enhances the utility of club membership, which would shift the point B2 vertically upwards and destroy the separating equilibrium if the sacrifice K were unchanged. To protect the club from low R free-riders the efficient sacrifice κ^* is increased to $\kappa^{*'} = \kappa^* + \Delta \kappa$ which is just enough to keep high wage types from joining. (They are indifferent between joining (at C2) and not joining (at A2)). That is, a subsidy induces a countervailing increase in the optimal sacrifice of $\Delta \kappa$, a tax on club members which further distorts labor supply.

To illustrate the extreme distortion due to subsidizing an exclusive club, consider a subsidy which potential entrants value more than club members. In that case the efficient countervailing increase in sacrifice, $\Delta \kappa$, will be exactly enough to dissuade entry of high wage types, but *makes club members worse off with the subsidy than they were without it*. (This is not the case illustrated in the Figure, in which club members have a net benefit from the subsidy. Their utility is higher at the new optimal choice (C1) than it was at the old (B1).)

This modest insight is an innovation on Iannaccone [1992]. In the Ultra-Orthodox context, such a subsidy could come in the form of transfers or pro-Ultra-Orthodox legislation. Military service, a tax on nonmembers from which club members are exempt, has the same distortionary effect. It exacerbates the free-rider problem by making the club more attractive.

Yeshiva Attendance as Sacrifice

Now reconsider the labor supply puzzle of Section II. Could yeshiva attendance have an element of sacrifice in it? It is a time-intensive activity which provides negligible training for work. Thus an efficient way to separate high from low wage types is by asking them to forgo years of employment (or secular education). Furthermore, this explanation is consistent with the cross-national and historic pattern of yeshiva attendance. Simply put, in Brooklyn, perhaps 3-5 years of yeshiva after high school are sufficient to signal commitment to the community and solve the free-rider problem. In Israel, if a man leaves yeshiva “early,” at age 35, it’s unclear if he is really committed (i.e. a low wage type) or if he has remained in yeshiva up till now merely to avoid military service and collect other subsidies. So he must remain a few more years after his draft exemption, typically five more, to signal his commitment.³⁴ Comparing the subsidized community

³⁴ Yoram Weiss raised a question associated with this explanation, namely that by age 40 the community is so familiar with an individual that there should be little left to signal. A possible answer comes from the attitudes of students: A typical older *kollel* (yeshiva) students’ explanation for his yeshiva attendance is that it insulates him from the corrupting influences of the secular world. When asked if at the age of 40, with 6 children, he was still a candidate for defection or backsliding, he answered: “Of course, I haven’t been tested till I leave.”

in Israel to that in New York or Montreal, this argument implies that *the effect of subsidies has been to delay entry into the labor force by 15-20 years!*

The yeshiva-as-sacrifice explanation is also consistent with the historical pattern of yeshiva attendance in Israel. Comparing panels A and B of Table I for families of adult yeshiva students indicates that the level of subsidy (the sum of transfers from institutions and the “residual”) more than doubled between the early 1980s and the mid 1990s. As subsidies per capita increased,³⁵ yeshiva attendance increased by half (Figure I). The analysis described in Figure V shows exactly that pattern: Increased subsidy exacerbates the free-rider problem and induces increased sacrifice, raising the average age of yeshiva completion to 40.³⁶

An alternative explanation for self-sacrifice expressed by the Ultra-Orthodox is that hardship builds character in preparation for later challenges in life.³⁷ This explanation suffers from an empirical difficulty. Why would the current, highly-subsidized Ultra-Orthodox community in Israel require more character-building than the less-subsidized community abroad or the same community when they were less subsidized two decades earlier in Israel?³⁸

Testable Implication: Differential Growth Rates of Yeshiva Attendance

The hypothesis that increased nonparticipation due to yeshiva attendance is due to subsidized sacrifice has a testable implication. Recall that subsidies to Sephardi Ultra-Orthodox families increased beginning in 1984, with the arrival of their own political party, while support for Ashkenazi Ultra-Orthodox was already high by the late 1970s. Since the mid 1980s subsidies have increased for both groups but more quickly for the former. The subsidized sacrifice mechanism predicts that yeshiva attendance should have increase faster for Sephardi Ultra-Orthodox than for Ashkenazi since the early 1980s.

Table IV reports yeshiva attendance by origin for Ultra-Orthodox Jews in the early 1980s and the mid 1990s. Sephardi Ultra-Orthodox Jews had lower yeshiva attendance rates in the early

³⁵ See Berman and Klinov [1997] for other evidence of increased subsidy.

³⁶ Forty is also the age at which a signal of commitment may be the most valuable, as a father will soon depend on the community to raise funds for apartments to allow his children to marry. Friedman [1991] reports on articles in the Ultra-Orthodox press documenting the stress faced by middle-aged Yeshiva graduates who must finance their children’s marriage. Landau [1993] reports on a massive philanthropic effort to provide fathers with such funds. Before their bankruptcy the Reichmann brothers reportedly provided thousands of dollars to Ultra-Orthodox newlyweds [Landau 1993]. In conversation, a number of sources estimated that a needy Ultra-Orthodox father could solicit about \$30,000 in a fund-raising tour of the diaspora, with the proper letter from a rebbe.

³⁷ This argument dates back at least as far as the *Musar* movement of the Lithuanian Yeshiva tradition. It was supported, with some qualification, by Rabbi Avraham Yeshaya Karelitz of Kossov, the *Hazon Ish*, the foremost leader of Ultra-Orthodoxy from the end of the Second World War till his death in 1953 [Kaplan 1992].

³⁸ Yet another candidate explanation is that yeshiva is a costly signal of status in a tournament where the prizes are good marriage partners. This approach is formalized in the “prestige-is-status” model of Cole et al [1992]. This may be a good explanation for the function of yeshiva in traditional Jewish communities up till the mid 18th century, where either wealth or scholarship were necessary to be part of the elite [Katz 1961, p. 23]. Yet this approach cannot explain the current puzzle of men remaining in yeshiva 20 years after marriage.

1980s than did the Ashkenazi, a pattern consistent with a lower rate of subsidy. They increased their yeshiva attendance (and decreased labor force participation) by 17.9 percentage points over a little more than a decade! That increase is 10.3 percentage points faster than the increase in attendance by the Ashkenazi group. These “difference in difference” estimates are shy of statistical significance but certainly consistent with the prediction that faster increases in subsidies induce massive reductions in labor supply.

To summarize, the club good model is capable of rationalizing the puzzling drop in labor supply among Israeli Ultra-Orthodox men. The faster drop among Sephardi Ultra-Orthodox is consistent with its testable implication. Subsidies have sharply reduced labor supply. The model implies that any action which makes membership more attractive induces an increase in sacrifice and will probably further reduce labor supply. The discriminatory nature of these policies makes them inefficient,³⁹ as they induce increased sacrifice by making membership more attractive.

IV. TWO MORE PUZZLES: THE BIRTH OF ULTRA-ORTHODOXY AND RISING FERTILITY

While the club-good approach was chosen to explain the labor supply puzzle, it can be extended to provide insight into two other puzzling aspects of Ultra-Orthodox behavior. This section first examines the paradoxical birth of Ultra-Orthodoxy: Why did a time-demanding form of religious practice develop during a period of rising wage opportunities? I then turn to the anomaly of high and *rising* fertility rates, in contrast to the fertility transition experienced by most ethnic groups in the modern world.

Puzzle #2: The Birth of Ultra-Orthodoxy

Most European Jews reacted to the rising wage opportunities provided by secular emancipation in the 18th and 19th centuries by shifting to less time-demanding forms of religious practice, ranging from assimilation to Reform Judaism. In contrast, *Orthodoxy and Ultra-Orthodoxy increased the stringency of time-intensive religious practice*. The Ultra-Orthodox were not only conservative about rejecting new forms of consumption (footnote 8), but amplified existing restrictions (such as the dietary restrictions), changed existing customs (dress codes, speaking Yiddish) into religious acts, and isolated themselves from the larger Jewish community.⁴⁰ Historians interpret

³⁹ This essentially argues against state law favoring any religious group. It relates to Iannaccone’s [1997] more general point that competition between religious groups reduces their ability to be prohibitive and intolerant. The question dates back to Smith’s debate with Hume over the welfare effects of state-supported religions. “[Hume] argues that religious laissez-faire generates powerful negative externalities, as religious suppliers promote superstition and hostility toward the members of all competing religions, leading ultimately to civil strife and political instability...”[Iannaccone 1997 p. 112]. Smith argues that free entry induces competition, which forces entrants and incumbents to be tolerant of each other. The absence of religious strife in the U.S., which separates church and state, is interpreted as supporting evidence. Berman [2000] develops this point in the Israeli context.

⁴⁰ For example, a religious pronouncement called the “*Pesach Din*,” (Hungary 1865) by a group of Ultra-Orthodox leaders forbade their followers from entering a synagogue which included any of a number of innovations typical of German Orthodoxy (for example, German spoken during the service, a stage at the front of

increased stringency of practice as “retrenchment,” a protective reaction to emancipation.⁴¹ That view is supported by the parallel history of Jews from the Muslim world. They did not develop Orthodoxy or Ultra-Orthodoxy until faced with the option of assimilation into secular Western culture upon arrival in Israel in the mid 20th century.

Yet the historian’s explanation is the economists’ paradox. Political and economic emancipation arrived together for 19th century European Jewry, offering higher wages through access to the gentile world. After thousands of years of community solidarity and relatively stable, uniform religious practice in Europe, why would a subculture split off to adopt a more time-intensive form of practice precisely when the value of time increased? It would seem that retrenchment in a more stringent fortress of practices would only encourage attrition.

The logic of prohibitions as efficient taxes can explain defensive retrenchment. As wages rise, so does the optimal tax rate. In Figure III an increase in the wage w to w' implies an increase in the efficient tax from $\tau = p - p^*$ to $\tau' = p - p^{**}$, because of the convexity of the labor supply curve.⁴² In order to induce a given increase in R , larger taxes are necessary at higher wages as the income effect makes labor supply less responsive to wages.

Interpreting prohibitions as taxes, this mechanism provides an explanation for the puzzling birth of Ultra-Orthodoxy. Despite increased real wages, a movement called *Orthodoxy* evolved in the late 18th century which increased the stringency of religious observance, demanding more time of their adherents than did traditional Judaism. Hassidism developed at about the same time as a more time-intensive and spiritual form of Judaism. A radical group of Orthodox formed the *Misnagdim* (literally, the opponents - of Hassidism) or “Lithuanians,” who demanded even greater stringency. Hassidim and Misnagdim together form the current Ultra-Orthodox, who are distinguished from the rest of Judaism by the stringency of time-intensive prohibitions and sacrifices demanded of members. The argument above suggests that these increases in the time-demands of religious practice can be interpreted as an efficient mechanism for defending the quality of communities against the increasing shadow price of members’ time.

The model also provides some insight into the speed at which religious practice diffused in response to increased real wages. Imagine heterogeneity in wages and a club that expels individuals who fail to comply with the prohibitions. As wages rise, the proportion of individuals who prefer untaxed wages to club affiliation is likely to also increase. High wage individuals would choose to self-insure through savings and find market alternatives for mutual insurance and

the hall rather than in the center, male choirs, a structure resembling a steeple.)

⁴¹ See, for example, Friedman [1991], Heilman [1992], Katz [1961] and Silber [1992]. As evidence, Heilman presents quotations from various Ultra-Orthodox leaders of the time. Katz [1961], Ellenson [1992] and Silber [1992] make the same claim about Orthodoxy. German Orthodoxy and especially Hungarian Orthodoxy certainly had elements of increased segregation in them and increased stringency of religious prohibitions. Silber [1992] interprets early Ultra-Orthodoxy as an extreme offshoot of Hungarian Orthodoxy.

⁴² In the diagram the horizontal distance between the labor supply curves also contributes to the size of the optimal consumption tax. The gap between the curves does not always increase monotonically in H , as drawn.

other services formerly provided by the club. *Attrition is accelerated* by increased stringency of prohibitions. This attrition may take the form of assimilation, with associated migration to cities,⁴³ or of joining a less stringent club (with a lower level of externalities or “social cohesion”).⁴⁴ Thus, this mechanism of simultaneous attrition and retrenchment rationalizes the development of all four cultural movements, assimilation, Reform, Orthodoxy and Ultra-Orthodoxy⁴⁵ as diffuse reactions to an (ideologically neutral) increase in real wages.

Are there alternative explanations for the birth of Ultra-Orthodoxy? Unlike the official histories of other sects, the Ultra-Orthodox do not attribute their origin to an epiphany. They describe their movement as a reaction to the birth of Reform Judaism and the accompanying danger of assimilation.⁴⁶ This explanation differs from that of the historians only in that it has protagonists, namely the insidious Reformers and Assimilationists.

That idea that prohibitions increase with wages is consistent with the widespread belief that the stringency of religious practice continues to increase among the Ultra-Orthodox. Many observers have remarked that the current generation is more stringent than their parents. The description of Ultra-Orthodoxy as the protective reaction of a traditional community against the incursion of markets is common to other religious sects, a theme I return to in the conclusions.

The other line of defense Ultra-Orthodoxy developed against the incursion of markets was the expansion of yeshiva study, first among Lithuanians and later among *Hassidim*. The prototype was the Volzhin *yeshiva* in Lithuania, established in 1802 as a boarding school and supported by donations from outside the community. Teenage boys studied the holy texts and commentaries in an effort to protect themselves from corrupting secular influences [Friedman 1991, p. 11]. In contrast, secular studies beyond literacy and numeracy at a junior high school level are viewed as a necessary evil. The fact that widespread Yeshiva study is contemporaneous with emancipation is consistent with the idea that signals of commitment were not necessary until emancipation allowed heterogeneity to express itself through selective attrition.

Destruction

In hindsight, the agenda of preserving a traditional way of life had tragic consequences. Unlike millions of European Jews, the Ultra-Orthodox rejected the option of emigration (mostly to America) in the beginning of the 20th century, stating explicitly that America was too attractive a secular culture. Likewise, the Ultra-Orthodox declined to join the generally secular Zionist

⁴³ Migration to cities among central European Jews was indeed concentrated among the wealthy and more secular [Herman Schwab *Jewish Rural Communities in Germany* (London: Cooper, 1956), cited in Hyman 1993].

⁴⁴ The prediction of this model that wage opportunities are intrinsically lower for the more observant is only true in this simple version of the model. More generally (an in Iannaccone [1992]) all that's necessary is that the observant have a greater preference for religious activity over consumption at the margin.

⁴⁵ Conservative Judaism would eventually evolve as a middle ground between Reform and Orthodoxy.

⁴⁶ Haim Sofer writes “Faith is endangered on all sides..” [so].. “Rabbis should find ways to cling to even the most inconsequential traditions.” in Silber [1992], p. 48. This process is also well described in Katz [1995].

migration to Israel in the 1930s. As a consequence, more than any other segment of Judaism, the Ultra-Orthodox were trapped in Europe to be nearly annihilated by the Nazis.

In the aftermath of the Holocaust, Ultra-Orthodox Jews established communities of survivors, with centers in New York, Jerusalem, Bnei Brak (in metropolitan Tel Aviv), Amsterdam and London. These communities regard themselves as a pious elite, charged with the sacred duty of perpetuating the correct form of devotion by reestablishing their shattered European cultural tradition.⁴⁷ Simon [1978] compares their view of other Jews to the view Black Muslims hold of other blacks: they pity those who lack the moral strength to preserve a sacred tradition against the forces of secular assimilation.

Puzzle #3: Increasing Fertility

Subsequently, Ultra-Orthodox Jews have enjoyed a cultural and demographic renaissance. Of all the cultures of central and eastern European Jewry, that of the Ultra-Orthodox is undoubtedly the most faithfully preserved. Their demographic success is due to extremely high birth rates. Table V reports *the total fertility rate⁴⁸ of Israeli Ultra-Orthodox women, which reached approximately seven and a half children per woman* in the mid 1990s.⁴⁹ Moreover, while fertility declined between 1980 and 1995 for other Jews, Muslims and Christians in Israel, *the fertility of Ultra-Orthodox women rose by about a child per woman*. This increase is statistically significant and consistent with conventional wisdom within the Israeli Ultra-Orthodox community. In contrast to the fertility transition experienced by most every other demographic group in the world, the Israeli Ultra-Orthodox not only maintain high fertility rates, but are increasing them.

How can we explain the fact that Israeli Ultra-Orthodox are bucking both the local and the international trend of fertility decline? The standard explanation of economists' [Becker 1960, 1991], is that fertility decreases with women's wages because of the increased shadow cost of raising children (including the cost of child quality). Yet real wage offers probably rose for Ultra-Orthodox women between 1980 and 1996. Real wages increased by about half over this period in Israel, so decreased fertility among other Jews, Christians and Muslims is consistent with the standard theory, while the increased fertility of Ultra-Orthodox women is not.

The club good approach, with efficient prohibitions, can solve this puzzle as well. As in the analysis of increased stringency of religious practice above, the efficient consumption tax, $\tau = p^* - p$, increases in real wages because of the convexity of the labor supply curve in Figure III. Interpreting prohibitions as a tax, increased prohibitions can partially mute increased wages,

⁴⁷ This fervent desire for cultural preservation was acknowledged by the first Israeli government in an agreement to allow about 400 yeshiva students, many of them refugees from destroyed European yeshivas, exemption from military service so that the study of the *Talmud* could be nurtured [Friedman 1991, Landau 1993].

⁴⁸Total fertility is the sum of current age-specific fertility rates. It is the predicted number of lifetime births a woman would have if she experienced current age-specific fertility rates over her lifetime.

⁴⁹ Fertility is calculated from LFS data by estimating births using the category "woman's own children aged 0-1" divided by two. In principle this category may also contain adopted children, though the comparison with Population Registry birth figures in Table V indicates only a tiny discrepancy.

leaving the value of an Ultra-Orthodox woman's time largely unchanged. That explanation is consistent with the conventional wisdom that stringency of practice increased over this period.

A muted substitution effect can explain why fertility did not decline for Ultra-Orthodox women as it did for others. To explain *increased* fertility requires more work. A possible mechanism is one in which transfers allow an efficient increase in prohibitions by easing an attrition constraint. If a club is concerned about attrition, its efficient level of prohibition will be influenced by the effect of prohibitions on club size. Attrition is a natural concern if it involves family members or if there are returns to scale in club activities, such as mutual insurance. Since transfers allow a club to augment the quality of its services, they also reduce the attractiveness of attrition, allowing prohibitions to be (efficiently) increased in order to induce more substitution of religious activity for work hours. Thus, increased transfers may have a positive substitution effect on fertility through increased prohibitions.⁵⁰ Section II reported on increased transfers to the Ultra-Orthodox community as their political power grew in the 1980s, so that the timing of subsidies is consistent with this explanation.

Testable Implication: Differential Subsidy and Fertility Growth

The differential increase in subsidy within the Ultra-Orthodox community provides an opportunity to test this explanation. Transfers to Ashkenazi Ultra-Orthodox Jews increased sharply in 1977, while transfers to the Sephardi Ultra-Orthodox lagged behind till 1984, when they increased discretely as well. The theory predicts that fertility will increase faster among the Sephardi Ultra-Orthodox over the 1980s and 1990s when their subsidies increased more quickly.

Table VI reports fertility rates of Ultra-Orthodox Jews by ethnic origin (adding a few intermediate years to the sample of Table V in order to gain precision.) The total fertility rate of Sephardi Ultra-Orthodox women was 4.57 in the early 1980s. It *rose by more than two and a half children* by the mid 1990s to reach 7.24 children per woman!

The velocity of this remarkable increase in fertility may be unparalleled in current demography. It dwarfs even the 0.89 child increase in total fertility experienced by Ashkenazi Ultra-Orthodox women over the same period. The difference between the Sephardi and Ashkenazi fertility increase is 1.78 children per woman and is statistically significant, indicating that fertility increases sharply with subsidies among Ultra-Orthodox Jews.

Alternative Explanations

⁵⁰ Formally, the attrition constraint is incorporated into the optimal taxation problem illustrated in Figure III as follows. Let θ be the transfer from government to the club and N be the number of members. The club's social welfare maximizer chooses the efficient tax τ to maximize $U(S,R,Q)$ for members where $p^* = p + \tau$;

$$Q = Q(\bar{R}, N, \theta), \quad Q_1 > 0, Q_2 > 0, Q_3 > 0; \quad \frac{w}{p^*} = MRS_{SR} = \frac{U_2}{U_1}; \quad \text{and subject to the no-attrition constraint}$$

$V(\tau, \theta, w, p) \geq V(0, 0, w, p)$, expressed in indirect utility. Then $\frac{d\tau}{d\theta} > 0$ if the attrition constraint binds (and the

complementarity between Q and S doesn't far exceed that between Q and R). Interpreting prohibitions as consumption taxes, subsidies induce clubs to increase their efficient levels of prohibition.

A number of alternative explanations for rising fertility are plausible, a priori. The Ultra-Orthodox often raise the most poignant of these, that communities and families are attempting to compensate for the losses of the Holocaust, a kind of extension of the custom of naming a child for deceased relatives. That sentiment cannot be refuted. Yet it cannot explain the even larger increases in fertility among Sephardi Jews, who did not directly experience the Holocaust.

Some commentators have speculated that the increased generosity of child allowances or improved fertility technology may account for increased fertility among the Ultra-Orthodox. Yet these effects would apply to all Israeli women, and Table V demonstrates that other Israeli women experienced declining fertility during this period. Muslim women, like the Ultra-Orthodox, have relatively low income and have traditionally had large families. The gap between Muslim and Ultra-Orthodox total fertility rates was only half a child in 1980, yet it grew to 3 children by 1995/96.

An alternative explanation for increased fertility which is consistent with faster fertility growth among the Sephardi Ultra-Orthodox is that increased subsidies had an income effect, which is generally assumed to be positive [Becker 1991]. Moreover, the community also used government funds to expand access to low cost child care facilities, further reducing the price of child-rearing. How much of the differential fertility growth between Ultra-Orthodox and other women in Israel can be accounted for by transfers? Precise accounting would require knowledge of income and substitution elasticities as well as information on a myriad of well-concealed subsidies and transfers.⁵¹ Yet an economists' interpretation of the modern fertility transition stresses that substitution effects through wages dominate income effects on fertility. Thus, it is hard to see how we can avoid looking for a substitution effect to explain the sharp increase in fertility, especially considering the exceptional increase among Sephardi Ultra-Orthodox women. The club good approach provides that mechanism, through increased prohibitions as an effective tax on wages, both in response to rising wages and through the effect of transfers in easing an attrition constraint on the level of prohibitions.

Alternatively, fertility may be subject to large positive social-multiplier effects of within-group interactions in fertility [Becker and Murphy 2000], which might be stronger for the tight-knit Ultra-Orthodox community than for other groups. The role of social interactions in accelerating fertility transition has been emphasized by demographers [Bongaarts and Watkins, 1996]. While that argument is inherently hard to refute empirically, the other evidence for club-like behavior among the Ultra-Orthodox invites emphasis on the role of subsidies in amplifying prohibition and inducing increased fertility.

Finally, what about explanations in which individuals have no choice? Perhaps an authoritarian community leader maximizes an objective function in which fertility and religious

⁵¹ A related possibility is that transfers aimed at children induced traditional Sephardi families with many children to join the Ultra-Orthodox. Sagi and Weinstein [1999] report anecdotal evidence from social workers of conversion to Ultra-Orthodoxy among Sephardi families. New converts can account for at most 1/3 of the Sephardi Ultra-Orthodox in the second period, which would require the unrealistic projected fertility rate of at least 12 children per woman to generate the apparent fertility growth in Table VI through composition effects alone.

practice have large weights, subject to a budget constraint which is relaxed by subsidies. That view is inconsistent with the comparison of the Israeli and Diaspora communities. The latter have more resources (they transfer funds to the former), yet have much lower levels of yeshiva study. History also provides evidence of individuals *exercising* choice. Abandonment of Ultra-Orthodoxy was widespread during the economic crisis at the end of the last century [Friedman 1991]. Evidence of individuals exercising choice argues for an approach requiring that individuals behave in a manner compatible with individual incentives.

In summary, both of the additional puzzles presented in this section, increased stringency of practice and increased fertility; can be rationalized as the efficient response of a club to a changes in wages and transfers. This approach provides a unified explanation for both these puzzles as well as for the initial puzzle of falling labor supply.

V. DEMOGRAPHIC AND ECONOMIC IMPLICATIONS

Consider now the implications of Ultra-Orthodox population growth and economic dependency. Figure VI reports population growth from 1979 through 1995 and uses a simulation to project population growth through 2025. (For details see Appendix 2.) The Israeli Ultra-Orthodox population doubled from about 140,000 in 1979 to about 290,000 in 1995.⁵² At current fertility rates it will reach a half million by the year 2010 and a million by 2025.⁵³

Table VII reports the Ultra-Orthodox population share, which is projected to increase from 5.2 percent in 1995 to 12.4 percent in 2025, by which time 22.5 percent of Israeli children will be Ultra-Orthodox. Those proportions probably underestimate the future Ultra-Orthodox population share as they do not take into account: a) the trend decrease in fertility among other population segments; and b) migration to Israel of Ultra-Orthodox Jews, which accounted for about 10 percent of the community's population growth between 1979 and 1995.

When combined with nonemployment and low human capital accumulation, this rate of population increase implies a future of welfare dependence for the Israeli Ultra-Orthodox community. That condition cannot be quickly remedied by current yeshiva students entering the work force. As reported in Table II, the wages of yeshiva graduates are quite low, for lack of human capital accumulation. In order to maintain even the modest standard of living described in Table I, at current levels of yeshiva attendance and fertility, outside support of the community would have to continue to increase at 4-5 percent annually, or double each 16-18 years, a growth rate much higher than Israel's rate of per capita output growth. At current levels of transfers and

⁵² These estimates do not include Ultra-Orthodox living in boarding schools, who are not sampled in the LFS. Those accounted for an additional 9000 individuals in 1983 (about 5 percent of the Ultra-Orthodox).

⁵³ These projections take into account only natural population increase, without considering net migration and net conversion. Population increase is slightly faster in the measured period (1979-1995) than in the projection, despite a lower fertility rate, suggesting that migration and conversion made a net positive contribution to Ultra-Orthodox population growth, though the data do not allow a precise calculation. What is clear from the Figure is that natural increase is the dominant force in Ultra-Orthodox population growth..

taxes the Ultra-Orthodox population growth rate will render Israel's welfare system insolvent and bankrupt municipalities with large Ultra-Orthodox populations.⁵⁴ The status quo is not sustainable without transferring an increased proportion of output to welfare programs or increasing donations from abroad at a geometric rate. Berman and Klinov [1997] and Berman [2000] argue that neither support from Jews abroad nor transfers from the government are likely to increase fast enough. Over the next decade the Ultra-Orthodox mutual insurance system faces collapse, as it did in the great abandonment of the faith in the late 19th century [Friedman 1991].

It is worth stressing that approximately 120,000 children live in households headed by a yeshiva attending father. Most of these families are in poverty. How then to transfer funds to these families, without exacerbating existing distortions through subsidized sacrifices and subsidized prohibitions? Berman and Klinov [1997] point out that conditioning draft deferment and stipends on not working is an enormous tax on the first hour of work. Yet, easing the conditions of deferment and exemption, (such as the reduction in exemption age to 25 proposed in the coalition agreement of June 1999) would increase the already inequitable subsidy to the Ultra-Orthodox. That implies an *increase* in the compensating sacrifice, probably not in the form of increased yeshiva attendance but in some other inherently distortionary form.

An efficient reform would increase equity, in the sense that it improves the utility of nonmembers as much as it improves the utility that they could gain by joining. A subsidy which increases the return to joining for a nonmember will be canceled and wasted by a counteracting increase in the optimal sacrifice. In this case *equity and efficiency dictate the same policy reform*. Pareto-improving subsidies are possible by replacing current distortionary subsidies with compensating, equitable support policies for all low income individuals and an equitable allocation of military service. With large enough equitable transfers the welfare of the Ultra-Orthodox community could be improved in the short term. More importantly, the resultant return to self-sufficiency by the Ultra-Orthodox could prevent a medium term collapse of the mutual insurance system that sustains this tradition.

VI. CONCLUSIONS

In describing a phenomenon as central to economics as labor supply and fertility, conventional microeconomic theory cannot explain the behavior of Ultra-Orthodox Jews. The club good approach succeeds. In the presence of positive social interactions with excludable access to their associated externalities, subsidies can induce extreme responses in labor supply and in fertility. It explains prolonged yeshiva attendance as an efficient sacrifice distorted by subsidy, and explains increased fertility as the result of consumption taxes through prohibitions, amplified by subsidies.

The logic of mutual insurance clubs suggests a novel economic interpretation of 19th century European Jewish history. In the absence of insurance markets, or government to

⁵⁴ Dahan [1998] analyzes the effect of *Ultra-Orthodox* demographics on Jerusalem's municipal finances.

safeguard their rights, Jews relied heavily on their village communities⁵⁵ for mutual insurance, a practice facilitated by traditional religious law. Emancipation brought the incursion of markets into these communities, increasing wages and making time-intensive mutual insurance system less attractive. Most Jews eventually reacted by assimilating or by adopting a less time-consuming form of religious practice. Emancipation also allowed the option of defection, either by replacing mutual insurance with self-insurance through savings or by migrating to towns and cities. That created a “lemons” problem of selective attrition for the mutual insurance club. In reaction an augmented form of religious mutual insurance club developed. Ultra-Orthodoxy. It demanded costly signals of commitment, isolating itself from the general community. It also augmented prohibitions to compensate for the increasing attractiveness of working and consuming, which distracted members from charitable activities that benefitted the club. By lucky accident of history and supportive government policy, that 19th century drama continues to play itself out in Israel under the light of 20th century data collection.

Is this merely an intriguing result, like potatoes as a Giffen good, particular to a specific group in an unusual historic setting? I think not. The incursion of markets into traditional societies in the form of high real wages is a universal experience, spanning history and continuing into the present. Kuran [1999] describes an analogous transition from communalist to individualist social structures in 19th and 20th century Islam.⁵⁶ Ultra-Orthodoxy is a backlash to that transition. Traditional Jewish communities may have been unusual in the extent of externalities to community activity, such as mutual insurance, but not in their existence. For example, Weber [1946] traces mutual support among U.S. Protestant “Sects” such as Baptists and Quakers to the historical roots of those communities in 17th century Europe. The anabaptist sects, such as the Amish, Mennonites and Hutterites are even more isolationist, with much stronger systems of mutual insurance. Nor is mutual insurance always tied to religious groups. Beito [1993] reports in 1920, before the “New Deal,” over 16 percent of adult Americans belonged to secular fraternal insurance societies, most of which dispensed mutual aid.

In the 19th century, in the face of emancipation and attraction of a market-oriented culture, Jewish religious practice diffused into assimilation and Reform at one extreme and Ultra-Orthodoxy at the other. In the 20th century the same forces confronted traditional Islam, leading to assimilation, Islamic modernism (*Salafiyya*) and radical Islam.⁵⁷ Like Jewish Ultra-Orthodoxy, both Sunni and Shi’ite Islamic fundamentalism are more stringent than traditional Islam. They too regard secular influence as dangerous and corrupting. I intend to pursue that analogy in future research, especially in countries where religious radicals are subsidized.

⁵⁵ Ninety percent of Jews in German-speaking central Europe and the majority in central and western Europe lived in villages with less than 200 inhabitants or small towns in the early 19th century. [Hyman 1992]

⁵⁶ Greif [1994] contrasts the communalist (he uses the term “collectivist”) legal institutions of the Magrheb traders to individualist institutions of the Genoese.

⁵⁷ See, for example, the description of Mawdudi’s Orthodoxy in India in Aziz [1967, pp. 208-213], or the description of the Muslim Brotherhood throughout Islam in Dekmejian [1995, p. 19] and in Faksh [1997, pp. 8-10].

Particularly intriguing is the connection of fundamentalism to fertility. Much of the strength of fundamentalism is derived from increasing population shares, not only in Israel but throughout the Muslim world. An economic explanation of fertility transition is that increased wages of women lower fertility by raising the shadow price of child-raising. Do other fundamentalist groups forestall demographic transition by using prohibitions to tax real wages? Does radical Islam dramatically increase fertility by augmenting prohibitions when subsidies are extracted from government, as the Israeli Ultra-Orthodox have done? The contribution of these induced fertility effects to political instability throughout the Islamic world is intriguing.

Besides religious sects, many social groups have benefits to social interaction which are excludable to nonmembers. These groups might usefully be thought of as clubs, perhaps as mutual insurance clubs. Akerlof's [1997] work on "social distance" recounts poignant tales from the classics of ethnography: A capable working class youth conforms to a norm of low education to avoid being perceived as disloyal to the "corner boys." A pregnant teenager who had aspired to a good secretarial job chooses "between lonely ambition and poverty among friends" and has the baby.⁵⁸ In both cases the implicit sanction faced is *exclusion* from a relationship of loyalty or friendship. Workplaces with peer pressure, criminal gangs, clubs of welfare mothers, families, communes, collectives and academic departments are just a few examples of social groups in which access to the benefits of interaction is excludable so that norms involving efficient prohibitions and costly but socially efficient signals are to be expected.

Subsidies to the Ultra-Orthodox club exacerbate distortionary sacrifices and prohibitions, causing reductions in labor supply and increases in fertility possibly unmatched in the labor and demographics literatures. Other clubs may also have extreme reactions to interventions and to changes in outside conditions. For example, gangs have prohibited behaviors, dress codes and sacrifices in the form of violent initiation rites.⁵⁹ An intervention increasing the self-esteem of teenagers or decreasing their need for protection, could reduce the attractiveness of gangs (which offer esteem and protection). That would reduce the costly prohibitions on achievement and costly sacrifices of personal development which gangs can afford to impose on their membership. Alternatively, policies which reinforce mutual support clubs in which members benefit from the achievement of others, such as families, may induce extreme increases in student achievement.

APPENDIX 1: SUBSIDIZED SACRIFICE

This appendix presents a formal version of the discussion of efficient sacrifice and subsidized sacrifice in Section III. As before,

$$(1) \quad U_i = U(S_p R_p Q) , \quad U_1, U_2, U_3 > 0 , \\ \text{for } i = 1 \text{ to } N \text{ members, where } Q = \sum_{j \neq i} \frac{R_j}{N-1} ,$$

⁵⁸ Examples are from Whyte [1955] and Rainwater [1970], respectively.

⁵⁹ Akerlof and Yellen [1994], page 177.

but there are no prohibitions and N is decided by the entry and exit decisions of individuals.

The time constraint is

$$(2) \quad T = H + R + K,$$

where $K \in (0, \kappa)$ is a voluntary sacrifice. Individuals who choose $K=\kappa$ join the high R club and enjoy Q^1 .

An efficient sacrifice, κ , must be just small enough to ensure that low wage types prefer to sacrifice and remain in their own, high R group. Expressed in an indirect utility function, that condition is

$$(3) \quad V(p, w^1, Q^1, K=\kappa) \geq V(p, w^1, Q^2, K=0).$$

It must also be large enough that high wage types prefer not to sacrifice and remain in the low R group,

$$(4) \quad V(p, w^1, Q^2, K=0) > V(p, w^1, Q^1, K=\kappa).$$

With enough type 2 (high wage) people, a κ will exist that separates types into low and high R groups as long as for a given Q , a) $R^2(\dots, Q) < R^1(\dots, Q)$ and b) type 2 people have a lower shadow price of Q than do type 1 people [Iannaccone 1992, Proposition 2]. The optimal κ imposes the smallest cost on the low wage - high R group which induces separation. The smallest possible κ which keeps the low R people out of the high R group is κ^* such that (if high wage types choose not to join when indifferent)

$$(5) \quad V(p, w^2, Q^2, K=0) = V(p, w^2, Q^1, K=\kappa^*).$$

Consider a model with an income subsidy in it, where the budget constraint is

$$(6) \quad I + wH_i = pS$$

Let income be composed of initial income and a subsidy θ received only by club members

$$(7) \quad I = I_0 + \theta .$$

Now the condition defining the lowest possible sacrifice required to exclude high wage types is

$$(8) \quad V(p, I_0, w^2, Q^2, K=0) = V(p, I_0, w^2, Q^1, K=\kappa^*).$$

For a subsidy $\theta > 0$ this condition becomes

$$(9) \quad V(p, I_0, w^2, Q^2, K=0) = V(p, I_0+\theta, w^2, Q^1, K=\kappa^*+\Delta\kappa) .$$

That is, any subsidy θ induces a countervailing increase in the optimal sacrifice of $\Delta\kappa$, a tax on group members which further distorts labor supply.

APPENDIX 2: DEMOGRAPHIC CALCULATIONS

Ultra-Orthodox families are identified as families in which at least one male reports his last school attended as yeshiva. This classification implies Ultra-Orthodox, as opposed to Modern Orthodox yeshiva, which is a separate educational stream.

Fertility calculations in Tables V, VI, and VII and in Figure VI count births using the Israel Labour Force Survey (LFS) question “own children aged 0-1 at home.” These may include a small number of adopted children, though the comparison with fertility rates for Jewish women as recorded in the population registry (Table VI) indicates only tiny discrepancies.

The total fertility rates in Table A1 are calculated using six age-specific fertility rates for women aged 18 through 54. These age-specific fertility rates are reported in panel A of Table A1 and in Figure VII. They indicate that the increase in fertility among Ultra-Orthodox women occurred mostly for women over thirty, while Ultra-Orthodox have higher fertility than other women at all relevant ages.

The LFS has a rotating panel of families. They are sampled for two adjacent quarters, left out for two quarters and then resampled for two quarters. My samples include all rotation groups in the first quarter of the year and only incoming rotations in the other four quarters. When years are combined to generate a sample, all rotation groups are included in the first quarter of the first year and only incoming rotations are included in subsequent quarters.

Demographic projections in Figure VI and Table VII are calculated using age-specific predicted fertility and mortality rates. Predicted fertility rates are calculated using the estimated coefficients in Table A1, Panel B, which reports regression of births (as defined above) on a quartic in age. (Beginning in 1995 the LFS reports age for adults of all ages, including the previously suppressed 18-24 category.) The quartic is a more precise predictor than seven age categories. Mortality figures are from the Population Registry, as reported in the 1993 Statistical Abstract of Israel. The base population for the projection is the 1995/96 sample. Projected population (1996-2025) is calculated by iteratively calculating age and gender specific cells using 1995/96 LFS figures as a base.

Upper and lower bounds for population projections are calculated using the upper and lower bounds of 95 percent confidence intervals for predicted age-specific fertility rates to predict births. While this is likely to be the major component in the projection's variance, these bounds understate the true 95 percent confidence interval as they do not reflect: sampling variance in age-specific populations for women of childbearing age in the base year; projection variance in age-specific populations of women of childbearing age; variance in actual mortality; and variance in actual fertility.

Measured population (1979-1995) is based on all individuals in families. The LFS provide sampling weights only for adults (aged 15 and over since 1986 or 14 and over previously). Children are weighted using their mother's sampling weights when available and that of the head of household when mother's sampling weight is not available for all children in the household. The same method is used to estimate age-gender specific cells in the 1995/96 base for the population projection.

BOSTON UNIVERSITY

AND NATIONAL BUREAU OF ECONOMIC RESEARCH

REFERENCES

Akerlof, George A. "Social Distance and Social Decisions," *Econometrica*, LXV (September, 1997), 1005-1027.

_____, and Rachel E. Kranton "Economics and Identity," *Quarterly Journal of Economics*, forthcoming.

_____, and Janet L. Yellen, "Gang Behavior, Law Enforcement and Community Values," in *Values and Public Policy*, Henry J. Aaron, Thomas E. Mann and Timothy Taylor, eds. (Washington D.C.: Brookings Press, 1994).

- Aziz, Ahmad, Islamic Modernism in India and Pakistan, (London: Oxford University Press ,1967).
- Azzi, Corry and Ronald G. Ehrenberg, "Household Allocation of Time and Church Attendance," Journal of Political Economy, LXXXIII (1975), 27-56.
- Becker, G.S., "An Economic Analysis of Fertility," in A.J. Coale (ed.) Demographic and Economic Change in Developed Countries, Princeton N.J.: Princeton University Press, 1960.
- _____ A Treatise on the Family, (Cambridge: Harvard University Press 1991).
- _____ and Kevin M. Murphy, "Social Forces, Preferences and Complementarity," in Social Markets and the Social Economy, (Cambridge: Harvard University Press, 2000).
- Beito, David T, "Mutual Aid, State Welfare and Organized Charity: Fraternal Societies and the 'Deserving' and 'Undeserving' Poor, 1900-1930," Journal of Political History, V(1993), 419-434.
- Berman, Eli "Subsidized Sacrifice: State Support of Religion in Israel," Contemporary Jewry, XXI, (Winter, 2000).
- _____ and Ruth Klinov, "Human Capital Investment and Nonparticipation: Evidence from a Sample with Infinite Horizons (Or: Mr. Jewish Father Stops Going to Work)," Jerusalem: The Maurice Falk Institute for Economic Research in Israel, Discussion Paper No. 97.05, 1997.
- Ben-Porath, Yoram (1980) "The F-Connection: Families, Friends and Firms and the Organization of Exchange," Population and Development Review 6, 1-29.
- Bongaarts, John and Susan Cotts Watkins (1996) "Social Interactions and Contemporary Fertility Transitions," Population and Development Review 22(4): 639-682 (December).
- Central Bureau of Statistics, Statistical Abstract of Israel, Jerusalem (various years).
- Camerer, Colin, "Gifts as Economic Signals and Social Symbols," American Journal of Sociology XCIV (1988): S180-214.
- Chiswick, Carmel Ullman, "The Economics of American Judaism," Shofar, XIII (1995), 1-19.
- Cole, H.L. , G.J. Mailath and A. Postlewaite, "Social Norms, Savings Behavior and Growth," Journal of Political Economy, C(1992) 1092-1125.
- Cornes, Richard and Todd Sandler The Theory of Externalities, Public Goods and Club Goods, (New York: Cambridge University Press, 1986).
- Dekmejian, R. Hrair, Islam in Revolution, Fundamentalism in the Arab World (Syracuse: Syracuse University Press, 1995.)
- Dahan, Momi, "The *Haredi* Population and Local Government, Part I - The Distribution of Income in Jerusalem," Jerusalem Institute for Israel Studies, Jerusalem, 1998.

- Ellenson, David, "German Jewish Orthodoxy: Tradition in the Context of Culture," in Jack Wertheimer (ed.) The Uses of Tradition (Cambridge: Harvard 1992).
- Faksh, Mahmud A., The Future of Islam in the Middle East, Fundamentalism in Egypt, Algeria and Saudi Arabia. Westport, Connecticut: Praeger, 1997.
- Friedman, Menachem, The Haredi (Ultra-Orthodox) Society — Sources, Trends and Processes, Jerusalem: The Jerusalem Institute, Research Series #41, 1991.
- Glaeser, Edward L., Bruce Sacerdote and Jose A. Scheinkman, "Crime and Social Interactions," Quarterly Journal of Economics, CXI (2) (May 1996) 507-548.
- _____ and Spencer Glendon, "The Demand for Religion," Harvard University mimeo, 1997.
- Gottschalk, Peter and Mary Joyce, "Cross-national Differences in the Rise of Earnings Inequality—Market and Institutional Factors" Review of Economics and Statistics LXXX (1998), 489-502.
- Greif, Anver, "Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies," Journal of Political Economy, CII (1994) 912-950.
- Heilman, Samuel C., The People of the Book: Drama, Fellowship and Religion, (Chicago: University of Chicago Press, 1983).
- _____, Defenders of the faith: inside Ultra-Orthodox Jewry, (New York : Schocken Books, 1992).
- Hyman, Paula E., "Traditionalism and Village Jews in 19th -Century Western and Central Europe: Local Persistence and Urban Nostalgia," in Jack Wertheimer (ed.), The Uses of Tradition, (Cambridge: Harvard 1992).
- Ilan, Shachar, "To the Right of the Right" Ha'Aretz, March 11, 1998a (Hebrew).
- _____, "The Yeshiva-Bocher Basket: 17 Thousand Shekel Gross" Ha'Aretz, March 2, 1998b, (Hebrew).
- _____, "Deceit" Ha'Aretz, May 19 (Hebrew), 1998c.
- _____, "The Rewards of Trespass" Ha'Aretz, May 26 (Hebrew), 1998d.
- Iannaccone, Laurence R. "Sacrifice and Stigma: Reducing Free-riding in Cults, Communes, and Other Collectives," Journal of Political Economy, C(1992), 271-291.
- _____ "Toward an Economic Theory of Fundamentalism," Journal of Institutional and Theoretical Economics, XV (1997), 100-116.
- _____ "Introduction to the Economics of Religion," Journal of Economic Literature, XXXVI (1998), 1465-1496.

- Kaplan, Lawrence, "The *Hazon Ish*: Haredi Critic of Traditional Orthodoxy," in Jack Wertheimer (ed.), The Uses of Tradition, (Cambridge: Harvard 1992).
- Kandel, Eugene and Edward P. Lazear, "Peer Pressure and Partnerships," *Journal of Political Economy*, 100(4), (1992), pp 801-817.
- Katz, Jacob, Tradition and Crisis: Jewish Society at the End of the Middle Ages (New York: Free Press of Glencoe, 1961)
- Kuran, Timur, Islam and Economics, Chapters 3 and 4: "Islam and Underdevelopment," University of Southern California, unpublished manuscript, 1999.
- Landau, David, Piety and Power, The World of Jewish Fundamentalism. (New York: Hill and Wang, 1993).
- Landers, Renee M., James B. Rebitzer and Lowell J. Taylor, "Rat Race Redux: Adverse Selection in the Determination of Work Hours in Law Firms," American Economic Review, LXXXVI (June 1996) 329-348.
- Maimonides, Moses, The Guide for the Perplexed, (1904 Translation from the 12th century Arabic Dalalāt al-Hairin by M. Friedländer, 2nd edition, New York: Dover, 1956).
- Rainwater, Lee, Behind Ghetto Walls: Black Families in a Federal Slum, Chicago: Aldine, 1970.
- Sagi, Rahel and Zvi Weinstein, "Peilut Proyekt Shikum Schunot baMigzar haHaredi," Israel Ministry of Construction and Housing, July 1999.
- Schelling, Thomas C., "Dynamic Models of Segregation," Journal of Mathematical Sociology I (1971) 143-186.
- Shahar, Charles, Morton Weinfeld and Randal F. Schnoor, Survey of the Hassidic and Ultra-Orthodox Communities in Outremont and Surrounding Areas, (Outremont, Quebec: Coalition of Outremont Hassidic Organizations, 1997).
- Silber, Michael K., "The Emergence of Ultra-Orthodoxy: The Invention of a Tradition," in Jack Wertheimer (ed.), The Uses of Tradition, (Cambridge: Harvard 1992).
- Simon, Rita James, Continuity and Change: A study of two ethnic communities in Israel, (Cambridge University Press, Cambridge, 1978).
- Smith, Adam, An Inquiry into the Nature and Causes of the Wealth of Nations (Reprint of 1776 version) (New York: Modern Library, 1965).
- Townsend, Robert M, "Risk and Insurance in Village India," Econometrica, LXII(1994), 539-91.
- Weber, Max, "The Protestant Sects and the Spirit of Capitalism," in H.H. Gerth and C. Wright Mills (translators and editors), From Max Weber: Essays in Sociology, (New York: Oxford, 1946).

_____, "Economy and Society (Berkeley, California: University of California Press, 1978).

Whyte, William F., Street Corner Society, 2nd edition, (Chicago: University of Chicago Press, 1955.)

TABLE I
SOURCES OF INCOME FOR HOUSEHOLDS HEADED BY PRIME-AGED MALES, 1980s & 1990s

	Households headed by married..		
	Ultra-Orthodox ^a prime-age male LF nonparticipants in yeshiva	Ultra-Orthodox ^a prime-age male Labor Force participants	prime-age males
A. 1993-1996			
Monthly household income (1995 NIS) (3NIS = \$1 in 1995)	3,463 (86)	6,207 (231)	8,240 (67)
Of which (%)			
Salary income	17.8	74.4	81.2
of which:	(1.4)	(1.7)	(0.3)
Husband's salary	.02	56.4	59.6
Wife's salary	17.2	16.4	18.2
Transfers from institutions (%)	38.9	1.7	2.8
Child allowance (%)	31.8	19.7	7.4
Other Sources ^b nec (%)	3.5	2.0	3.5
Residual ^c	7.8	2.3	5.1
Children	4.5	4.2	2.1
Household Members	6.6	6.5	4.6
Poverty Line in 1995 NIS (based on household members)	3,777	3,735	2,930
Observations	397	174	10,143
B. 1979-1982			
Monthly household income (1995NIS) (3NIS = \$1 in 1995)	1,787 (73)	3,747 (141)	4,480 (27)
Of which (%)			
Salary income	33.3	83.1	88.2
of which:	(2.7)	(1.4)	(0.2)
Husband's salary	1.5	65.7	70.4
Wife's salary	31.8	13.7	15.6
Transfers from institutions (%)	8.3	0.8	0.9
Child allowance (%)	24.0	12.1	6.6
Other Sources ^b nec (%)	4.4	1.7	2.4
Residual ^c	30.1	2.4	1.9
Household Members	5.3	6.0	4.5
Observations	188	179	10,014

a. Ultra-Orthodox families are identified in the Labour Force Survey (LFS) as families in which at least one male reports his last school attended as yeshiva. b. "Other Sources" include income from pensions, transfers from abroad, social insurance programs and self employment income. c. Residual is the difference between gross income and income from all reported sources. Source: microdata from the CBS, Israel Income Survey, which excludes the self-employed. (3.4% of Ultra-Orthodox prime aged males were self-employed in LFS 1993-1996). Children and household members are calculated from LFS. Poverty line in 1995 was 830 NIS per month x number of standard persons per household as calculated by the National Insurance Institute formula.

TABLE II
HUMAN CAPITAL WAGE REGRESSION

LHS Variable: Log hourly wage

	1993-1996			1979-1982		
Education	0.078 (0.003)	—	—	0.074 (0.002)	—	—
Regular education	—	0.094 (0.002)	0.094 (0.002)	—	0.078 (0.002)	<i>0.078</i> (0.002)
yeshiva education	—	0.018 (0.005)	<i>0.012</i> (0.007)	—	0.023 (0.015)	<i>0.015</i> (0.016)
yeshiva	—	0.73 (0.12)	0.94 (0.22)	—	0.40 (0.22)	0.63 (0.30)
Experience	0.041 (0.003)	0.034 (0.002)	0.034 (0.003)	0.030 (0.003)	0.030 (0.003)	0.030 (0.003)
Experience x yeshiva	—	— ----	-0.007 (0.006)	— ----	— ----	-0.006 (0.006)
Observations	9,401	9,401	9,401	7,713	7,713	7,713
R ²	0.237	0.272	0.272	0.203	0.215	0.215

a. All specifications also include a quadratic term in experience, year indicators, an indicator for currently married and an indicator for Jewish.

b. The sample includes observations from micro data of the CBS Israel Income Surveys. 168 individuals report yeshiva as last school attended in the 1993-1996 sample and 142 do so in the 1979-1982 sample. Includes prime-aged males who reported at least one hour worked in the previous week, were not recent immigrants, and reported years of schooling. Hourly wage is measured in 1995 NIS.

c. Experience was calculated as (age – education – 6) for yeshiva graduates and non-Jews and as (age – experience – 9) for Jews. To the extent that yeshiva graduates and non-Jews serve in the military their labor market experience will be overestimated.

d. See Table A2 for descriptive statistics and Berman [1998] for a full set of coefficients.

e. Source: microdata from the CBS, Israel Income Survey. The self-employed are excluded from the microdata..

TABLE III
FULL TIME YESHIVA ATTENDANCE RATES OF ULTRA-ORTHODOX MEN
1993-1996

Age	All Household Heads	of which: Household Heads with at least five children
25-29	77.4 % (2.6)	
30-34	66.4 (2.7)	79.8 % (3.6)
35-40	57.2 (3.0)	65.5 (3.7)
41-44	46.1 (4.2)	54.1 (5.1)
45-54	24.5 (3.3)	41.1 (7.1)
54+	6.3 (1.2)	

a. Standard errors in parentheses

b. Figures in bold italics are for draft exempt men.

c. Source: 1993/96 LFS sample.

d. See note to Figure 2 for a definition of full time yeshiva students.

TABLE IV
FULL-TIME YESHIVA ATTENDANCE RATES BY ORIGIN: 1980-1996

Men aged 25-54

Period	Sephardi ^a	Ashkenazi ^a	Native Israeli	All
			Parents ^a	Ultra-Orthodox
1980-1984	38.0 ^b %	46.8	55.1	45.4
	(3.0) ^c	(2.2)	(5.1)	(1.7)
obs.	260	520	98	880
1994-1996	55.9	54.4	70.4	57.8
	(3.1)	(2.5)	(3.8)	(1.8)
obs.	255	386	147	796
Change	17.9	7.6	15.3	12.4
	(4.8)	(3.6)	(6.8)	(2.6)
Difference in difference:				
Sephardi - Ashkenazi		10.3		
		(6.0)		
Sephardi -			7.5	
Ashkenazi & Native			(5.7)	

Source: LFS, 1980-1984, 1994-1996.

a. "Sephardi" Jews are identified by own or fathers' birthplace in Africa or Asia. "Ashkenazi" Jews are identified by own or fathers' birthplace in Europe, America or Oceania. Native born parents are generally Ashkenazi, especially in the 1980s, since the majority of Sephardi Jews arrived in Israel after 1950. Origin is defined according to country of birth or the country of birth of parents. In 1980-1984, Ashkenazi Jews make up 59% of the sample, 29% are Sephardi and 11% cannot be classified as they have native Israeli parents. In the 1994-96 sample 44% are Ashkenazi, 30% Sephardi and 25% children of native Israelis. The latter are mostly Ashkenazi, especially in the early 1980s.

b. An attendance rate is the ratio of yeshiva nonparticipants (who list full time yeshiva study as their reason for nonparticipation) to Ultra-Orthodox Jews. Ultra-Orthodox Jews are identified in the survey as individuals living in a household in which at least one male declares his last school attended as yeshiva.

c. Heteroskedasticity-consistent standard errors in parentheses.

TABLE V
TOTAL FERTILITY RATES OF ISRAELI SUBPOPULATIONS

A. Source: Labour Force Survey

Period	Full Population	Jews	Ultra-Orthodox Jews ^c	All other Jews
1980-1982	2.99 ^a	2.76	6.49	2.61
	(0.04) ^b	(0.04)	(0.31)	(0.04)
obs.	31347	27635	1040	26569
1995/96	2.66	2.53	7.61	2.27
	(0.04)	(0.05)	(0.30)	(0.05)
obs.	27866	22776	1021	21755
Change	-0.33	-0.23	1.13	-0.34
	(0.06)	(0.06)	(0.44)	(0.06)

B. Source: Population Registry

Period	Full Population	Jews	Christians	Muslims
1980	3.14	2.76	2.66	5.98
1995/96	2.90	2.57	2.19	4.65
Change	-0.24	-0.19	-0.47	-1.33

a. Total Fertility Rates in Panel A are calculated from micro data using the Israel Labour Force Survey (LFS) question “own children aged 0-1 at home.” These may include a small number of adopted children. Age specific fertility rates are calculated for 6 age categories for women aged 18 through 54. Details are reported in Appendix Table A1.

b. Heteroskedasticity-consistent standard errors in parentheses.

c. Ultra-Orthodox Jews are identified in the survey as individuals living in a household in which at least one male declares his last school attended as yeshiva.

LFS samples include all unique rotation groups the first time they are observed. Population Registry figures are from the Statistical Abstract of Israel 1982 and 1997. The full population total fertility rate in the LFS is less than that of the Population Registry due to undersampling of the Muslim population in the LFS.

TABLE VI
FERTILITY BY RELIGIOUS AFFILIATION AND ETHNIC ORIGIN

A. Ultra-Orthodox Jews

Period	Sephardi	Ashkenazi	Native Israeli Parents	All Ultra- Orthodox
1980-1984	4.57 (0.36)	6.91 (0.32)	8.70 (0.72)	6.28 (0.23)
obs.	613	764	194	1574
1994-1996	7.24 (0.50)	7.80 (0.42)	7.85 (0.54)	7.57 (0.27)
obs.	417	560	321	1310
Change	2.67 (0.62)	0.89 (0.53)	-0.84 (0.90)	1.30 (0.35)
Difference in difference:				
Sephardi - Ashkenazi		1.78 (0.82)		

B. Non-Ultra-Orthodox Jews

Period	Sephardi	Ashkenazi	Native Israeli Parents	All non Ultra-Orthodox
1980-1984	2.84 (0.05)	2.44 (0.05)	2.27 (0.13)	2.63 (0.03)
obs.	19607	16570	2451	38909
1994-1996	2.50 (0.06)	2.09 (0.06)	2.17 (0.12)	2.26 (0.04)
obs.	12557	11679	3333	28133
Change	-0.34 (0.08)	-0.35 (0.08)	-0.10 (0.18)	-0.37 (0.05)

Total Fertility Rates are calculated from micro data using the Israel Labour Force Survey (LFS). See notes to Table V. Heteroskedasticity-consistent standard errors in parentheses. Ultra-Orthodox Jews are identified in the survey as individuals living in a household in which at least one male declares his last school attended as yeshiva. Definitions of ethnic groups are described in notes to Table IV.

TABLE VII
POPULATION PROJECTIONS FOR ULTRA-ORTHODOX JEWS
 (THOUSANDS)

Period	All Ages			Children (ages 0-17)		
	Ultra-Orthodox	All Israelis	Percent Ultra-Orthodox	Ultra-Orthodox	All Israelis	Percent Ultra-Orthodox
1995	280	5370	5.2	150	1860	8.1
2010	510	6600	7.7	280	2140	13.1
2025	990	7970	12.4	570	2540	22.5

Based on 1995/96 LFS sample. Projections for 2010 and 2025 are calculated by iteratively applying fertility and death rates to the 1995/96 base populations of Ultra-Orthodox and all Israelis. For details see Appendix A.

TABLE A1 AGE-SPECIFIC FERTILITY RATES BY SUBPOPULATION

A. Age groups (for Total Fertility Rate calculations in Tables V and VI)

Age Group	Ultra-Orthodox Jews		<i>Non-Ultra-Orthodox Jews</i>	
	1980-1982	1995/96	<i>1980-1982</i>	1995/96
18-24	0.184 (0.017)	0.190 (0.018)	<i>0.086</i> (0.003)	0.036 (0.002)
25-29	0.426 (0.023)	0.413 (0.026)	<i>0.183</i> (0.004)	<i>0.153</i> (0.005)
30-34	0.304 (0.027)	0.394 (0.027)	0.133 (0.004)	0.147 (0.005)
35-39	0.252 (0.041)	0.278 (0.030)	0.067 (0.003)	0.079 (0.004)
40-44	0.052 (0.019)	0.151 (0.026)	0.014 (0.002)	0.021 (0.002)
45-49	0.006 (0.004)	0.019 (0.010)	0.003 (0.001)	0.002 (0.001)
50-54	0 (-)	0 (-)	0.0004 (0.0003)	0.0006 (0.0004)
observations	1040	954	26595	21755
Root MSE	0.267	0.272	0.190	0.168

B. Quartic Regression Predicting Births, 1995/96 (for projections, Figure VI & Table VII.)

Variable	<i>Ultra-Orthodox Jews</i>	All Women
Age	0.365 (0.043)	0.191 (0.006)
Age ²	-0.0099 (0.0014)	-.0054 (0.0002)
Age ³	0.000083 (0.000014)	0.000047 (0.000002)
constant	-3.85 (0.427)	-2.01 (0.07)
observations	954	24546
Root Mean Squared Error	0.270	0.194

Total Fertility Rates are calculated from micro data using the Israel Labour Force Survey (LFS) question “own children aged 0-1 at home.” These may include a small number of adopted children. Heteroskedasticity-consistent standard errors in parentheses. Ultra-Orthodox Jews are identified in the survey as individuals living in a household in which at least one male declares his last school attended as yeshiva. LFS samples include all rotation groups in the first quarter of the year and only incoming rotations in the other four quarters.

APPENDIX 3: DESCRIPTIVE STATISTICS FOR EARNINGS EQUATIONS

SAMPLE OF EMPLOYED MALES AGED 25-54

	1993-1996		1979-1982	
	Mean	Std. Dev.	Mean	Std. Dev.
Hourly wage	27.4	20.2	17.3	14.0
Log hourly wage	3.11	0.64	2.65	0.64
Years of education	12.8	3.6	11.5	3.7
of which: yeshiva	20.2	7.5	15.6	4.1
Non-yeshiva	12.7	3.4	11.4	3.7
yeshiva	0.019	0.135	0.019	0.135
Experience	16.6	9.0	16.8	9.7
of which: yeshiva	12.1	9.2	16.7	10.0
Non-yeshiva	16.6	9.0	16.8	9.7
Age	37.9	8.2	37.2	8.4
of which: yeshiva	38.2	7.2	38.4	8.3
Non-yeshiva	37.9	8.2	37.1	8.4
Experience-squared	354.9	330.6	376.4	381.2
Currently married	0.82	0.39	0.91	0.29
Jewish	0.88	0.32	0.96	0.21
	9,401 observations		7,713 observations	

a. Micro data, Central Bureau of Statistics, Israel Income Surveys, 1979-1982, 1993-1996. Includes prime-aged males who reported at least one hour worked in the previous week, were not recent immigrants, and reported years of schooling. Hourly wage is measured in 1995 NIS.

b. 168 prime aged males report yeshiva as last school attended in 1993-1996 sample. 142 report yeshiva as last school attended in 1979-1982.

c. Experience was calculated as (age – education – 6) for yeshiva graduates and non-Jews and as (age – experience – 9) for Jews. To the extent that yeshiva graduates and non-Jews serve in the military their labor market experience will be overestimated.

d. Weighted using household sampling weights.

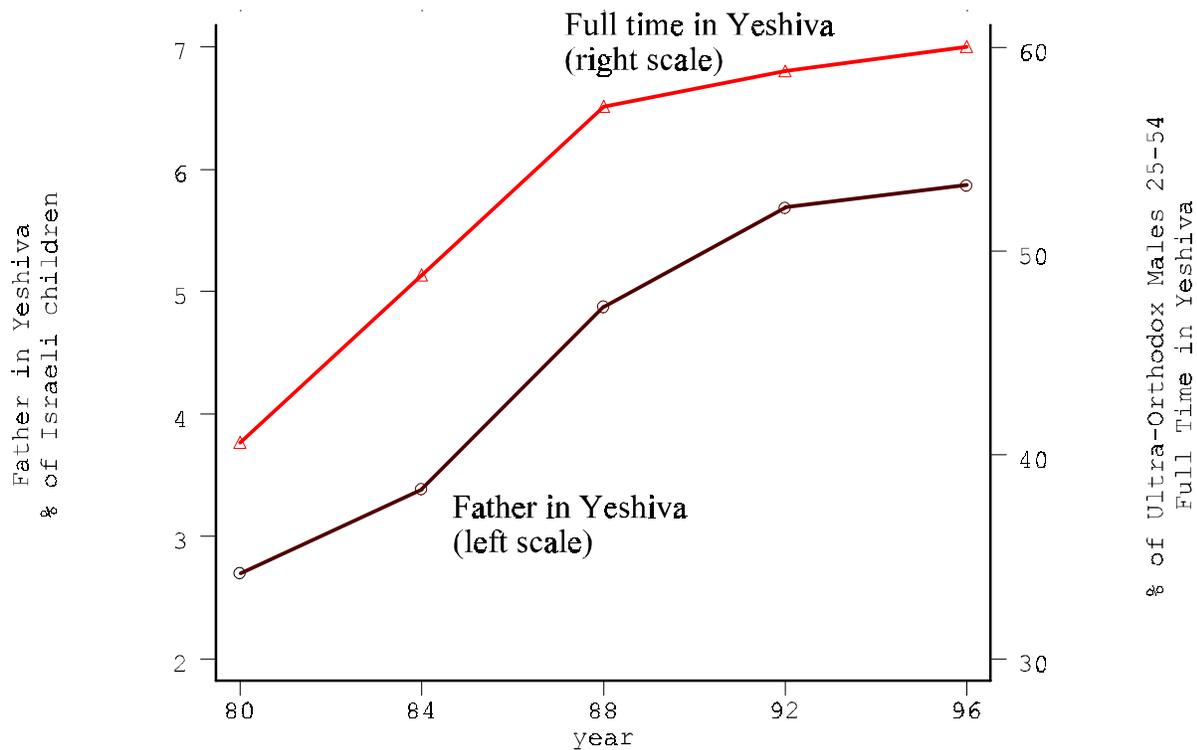


FIGURE I
YESHIVA STUDENTS AND THEIR CHILDREN: 1980-1996

Men are classified as full time yeshiva students if they are labor force nonparticipants, report their reason for nonparticipation as studies and report their current school attended as yeshiva. The Ultra-Orthodox nonparticipation rate is higher. Between 90 and 99% of Ultra-Orthodox nonparticipants list studies as their reason for nonparticipation. Children are classified as “Father in yeshiva” if they reside in a household in which the head of household or her spouse is a full time yeshiva student. Source: LFS micro data. See Appendix for details of weighting procedure.

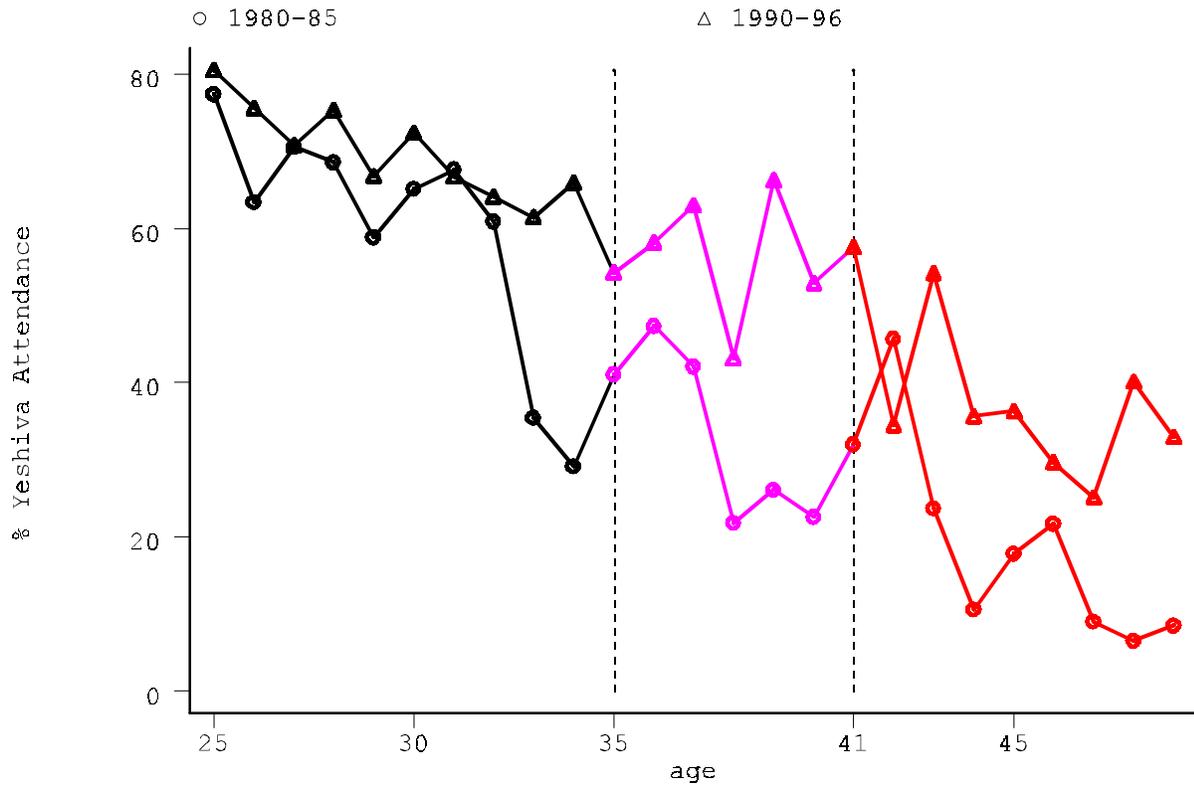


FIGURE II
FULL TIME YESHIVA ATTENDANCE AMONG ULTRA-ORTHODOX MEN

See note to Figure I.

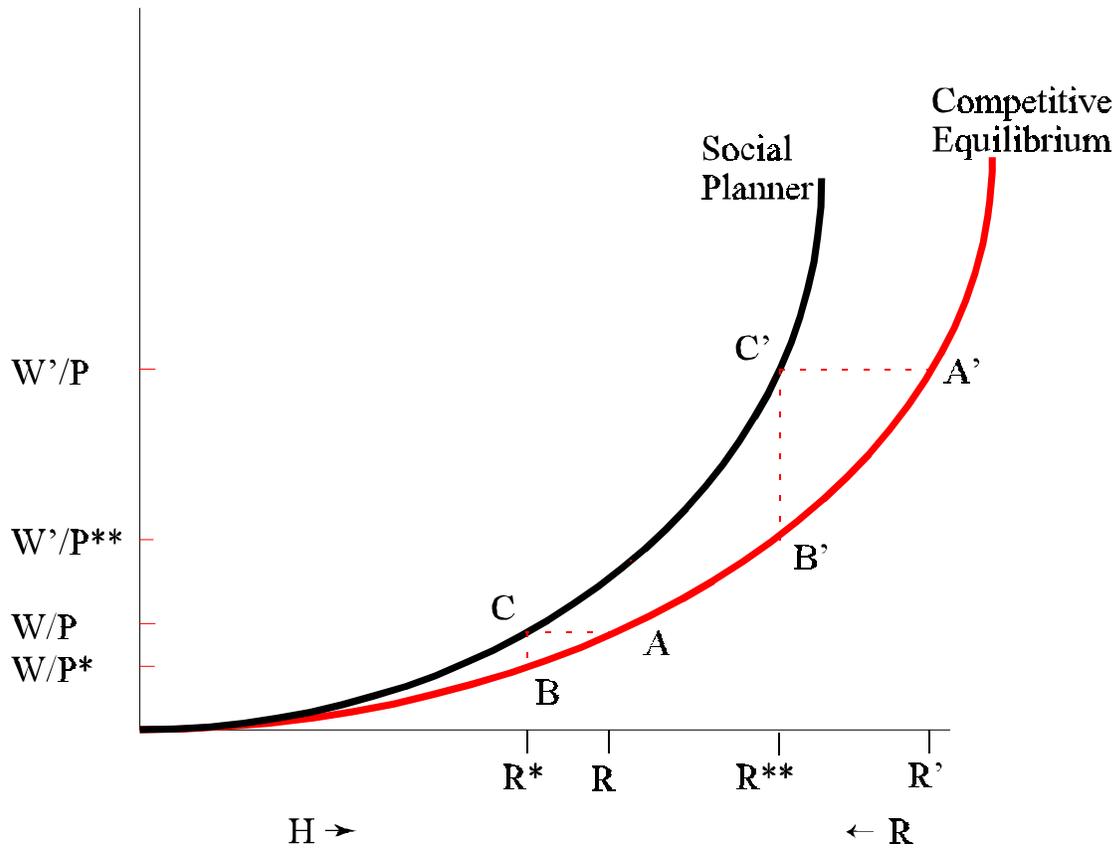


FIGURE III
OPTIMAL TAXATION THROUGH PROHIBITION

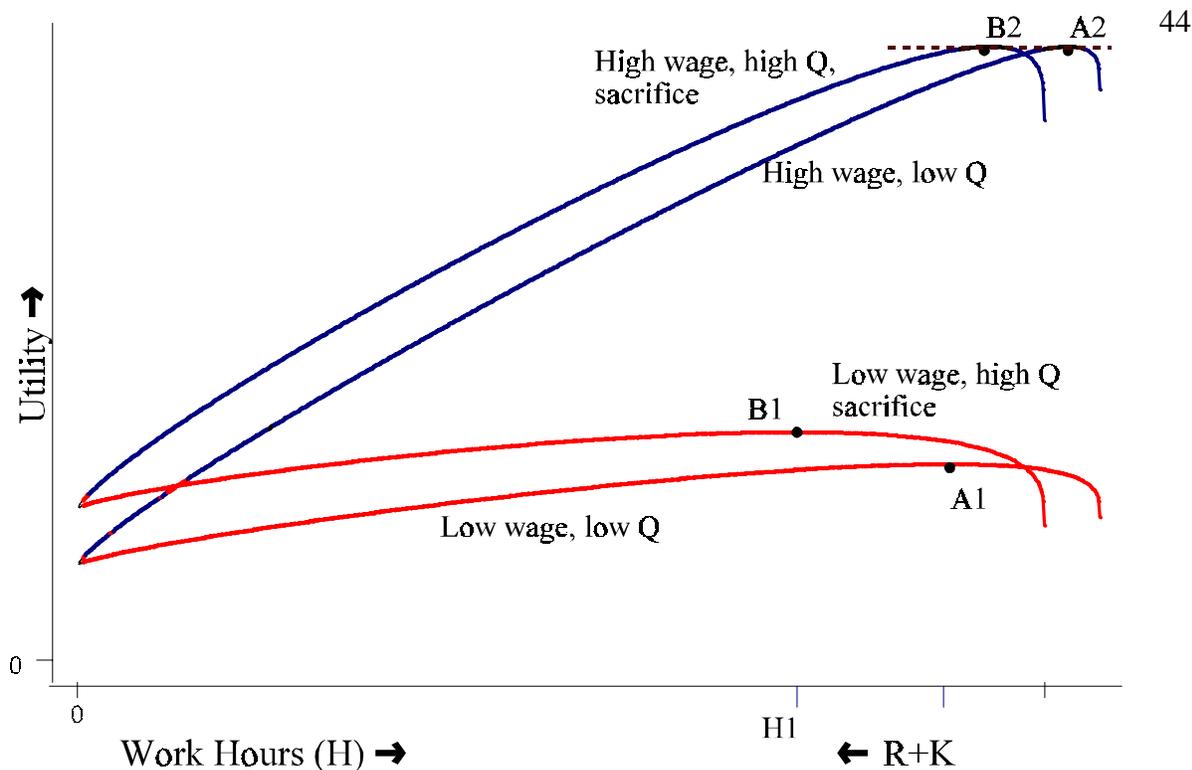


FIGURE IV
EFFICIENT SACRIFICE

The figure illustrates the incentive of a low wage group to exclude members of a high wage group from their club. A nonselective club will have low quality and provide low wage members with low utility at A1. Imposing a required sacrifice of time κ^* on club members is sufficient to induce exclusion of high wage individuals (who are indifferent between points B2 and A2), allowing the establishment of an exclusive club for low wage individuals with higher utility at B1. The induced separating equilibrium is (B1, A2).

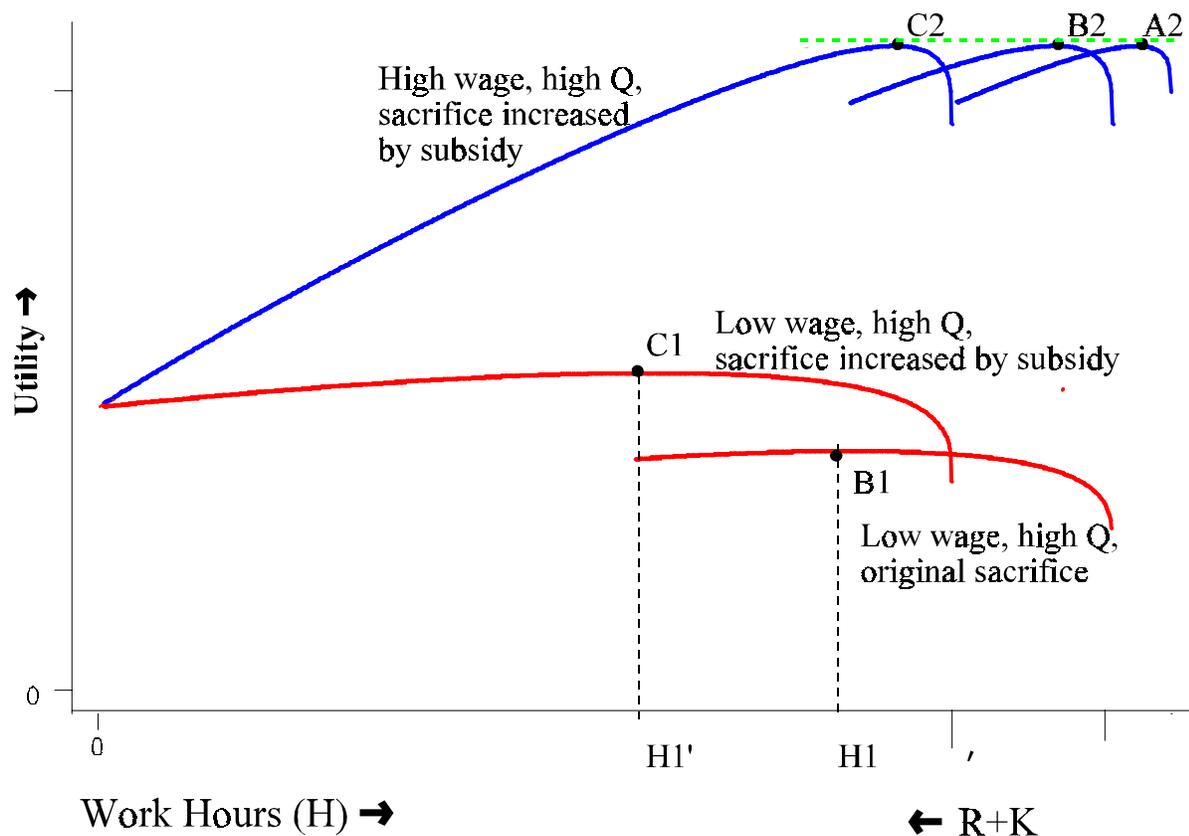


FIGURE V
SUBSIDY INDUCES INCREASED SACRIFICE

The figure illustrates the effect of subsidy in the efficient sacrifice. B1 and A2 describe the equilibrium in Figure IV. The introduction of a subsidy to club members is reflected in the upward shift of the leftmost utility curves for both high and low wage types. To exclude high wage members the low wage club must compensate for the increased attractiveness of the club by raising κ^* to κ^{**} , which preserves the indifference of high wage types between joining and remaining outside (comparing C2 to A2). The new separating equilibrium is (C1, A2).

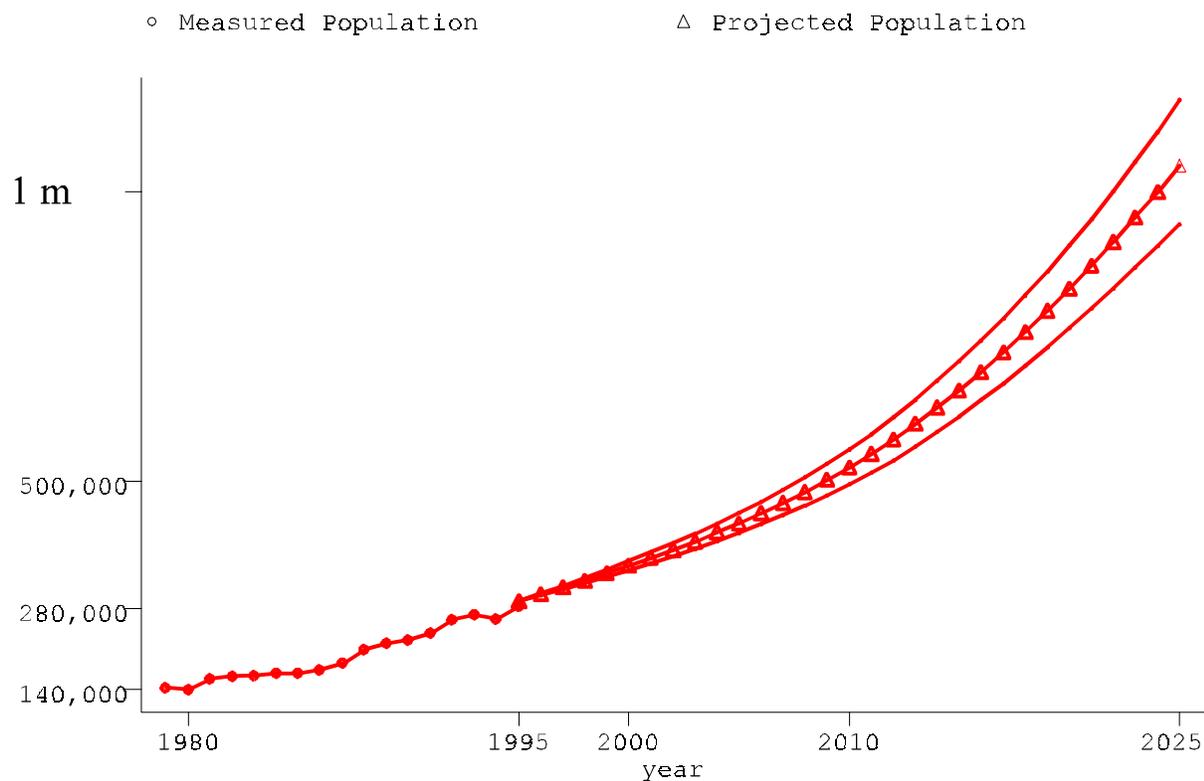


FIGURE VI
ULTRA-ORTHODOX POPULATION: 1979-2025
 PROJECTION USING 1995/96 FERTILITY RATES

- Measured population (1979-1995) is based on all individuals in families with at least one adult male who reports last school attended as yeshiva, in the Israel Labour Force Survey (LFS).
- Projected population (1996-2025) is calculated by iteratively forecasting age and gender specific cells using 1995/96 LFS averages as a base. Age-gender specific mortality rates are from the population register, 1992. Age-specific fertility is predicted using a regression of births on women's age in the 1995/96 LFS. See Appendix 2 for details.
- Upper and lower bounds for population projections are calculated using the upper and lower bounds of 95% confidence intervals for predicted age-specific fertility rates to predict births. While this is likely to be the major component in variance of a projection, these bounds are smaller than the true 95% confidence interval for population as they do not reflect: sampling variance in age-specific populations for women of childbearing age in the base year; projection variance in age-specific populations of women of childbearing age; variance in actual mortality; and variance in actual fertility.

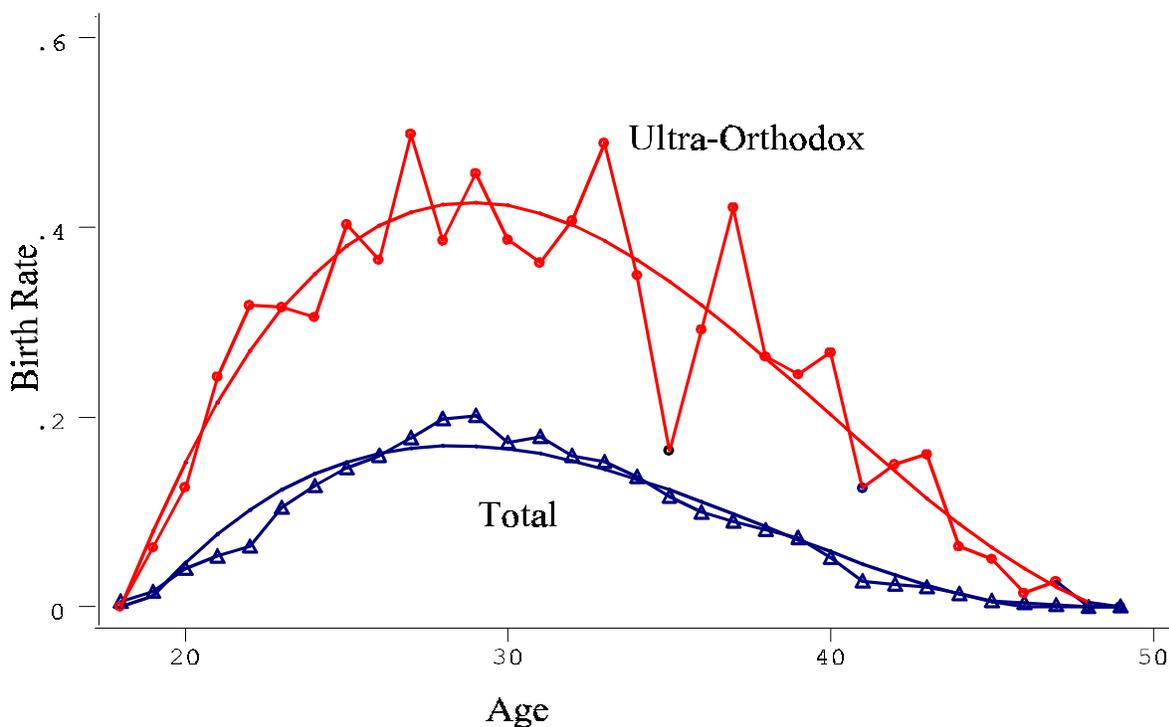


FIGURE VII
BIRTH RATES: ULTRA-ORTHODOX AND ISRAELI AVERAGE, 1995/96

- a. Births rates are measured using the LFS category "own children aged 0-1", which applies to all women aged 15 or older.
- b. Upper two lines represent births to Ultra-Orthodox women. Lower two lines refer to all women
- c. Smooth lines represent fitted values from a regression of births on age, age² and age³.