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## Changing the Cost of Children and Fertility: Evidence from the Israeli Kibbutz

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# Changing the Cost of Children and Fertility:

# Evidence from the Israeli Kibbutz[*]

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Abstract: Prior to 1996, Israelis in collective communities (kibbutzim) shared the costs of raising children equally. This paper examines the impact of privatizing costs of children on the behavior of young couples using universal microdata on kibbutz members. Exploiting variation in the increase in cost sharing across kibbutzim, we estimate that lifetime fertility declined by 0.59 children in the cohorts of affected parents. We also examine the exit decisions of members, and find that couples were most likely to leave the kibbutz if they were either higher income or lower fertility. This pattern is also observed among Israeli emigrants, in which higher educated and lower fertility couples are more likely to leave Israel.

## I.      Introduction

To what extent do economic considerations affect fertility decisions? Following Becker's (1960) seminal work on the economics of the family, economists regard financial incentives as crucially important to explaining fertility choices. Models of home production generally regard the price of childbearing as a key factor in predicting fertility. Since many countries have also experimented with subsidies (e.g. France) or special tax levies (e.g. China) on childbearing, the question has policy relevance as well.[1] However, estimating the magnitude of this effect is challenging, and even demonstrating the existence of a link is a difficult empirical exercise.

In this paper, we exploit dramatic changes in the cost of childbearing to parents on Israeli kibbutzim (collectives) to examine the relative importance of cost considerations in fertility choices. The fertility patterns among kibbutz members differed in two important respects from the patterns exhibited by other Israeli Jews. First, on average, women in kibbutzim had roughly .45 more children than their counterparts in Israeli cities. Second, as observed by Ben-Porath (1973) analyzing data from earlier cohorts, unlike the rest of Israel's population, the traditional negative correlation between education and fertility is not observed (see Figure 1). Ben-Porath attributed this to the fact that parents on the kibbutz faced no private budget constraint. Since members shared all earnings equally, time spent raising children required no sacrifice in consumption, and so mothers with higher potential wages had no more to lose by having another child than other mothers. Furthermore, since parents on the kibbutz were insulated from the direct financial cost of childbearing, they were further incentivized to have large families.

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[1] See Laroque and Salanie (2012) for a thorough analysis of France's subsidy policies and Ebenstein (2010) for an examination of Chinese fertility responses due to financial punishments associated with the One Child Policy.

Traditionally, the cost of raising children was borne fully by the collective, with all costs of daily life shared equally among members. Food, medical and day care, clothing, and education were funded by the collective. Parents with more children were allocated larger housing units by the kibbutz (singular of kibbutzim), insulating parents from virtually any (financial) cost of having an additional child. Moreover, since the accumulation of private property was banned and all income was transferred to the collective, raising children did not involve a time cost of foregone earnings either. This system generated a context for a 'free-rider' effect, in which the insulation from costs led to higher fertility in kibbutzim relative to cities (Abramitzky 2011).

Beginning in the late 1980s, however, the movement encountered crisis and the system unraveled quickly. As a result of increasing interest rates and a change in government policies towards subsidizing kibbutzim, all but the wealthiest kibbutzim were faced with financial ruin (Plessner 1994 and Schwartz 1995). The response by most kibbutzim was "privatization", transferring the costs of food, day care, and clothing from the collective to the private individual and shifted the kibbutzim to a system where members receive individual differential pay to fund these services (Russell et al. 2013).[2] Between 1996 and 2005, 166 of the 259 kibbutzim were privatized, providing a unique opportunity to examine how fertility responds to changing the costs to childbearing.

Prior to the movement towards privatization, all the kibbutzim participated in a system of "mutual guarantee" where the other kibbutzim in their ideological movement would guarantee the debt of the other member kibbutzim (Encyclopedia Judaica 2008). The anticipated assistance from other kibbutzim allowed the poorer kibbutzim to take on debt, and led to a weak relationship between a kibbutz' income and expenditure. The crisis led to the virtual

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[2] Most privatized kibbutzim still had in place differential pay "limits", in which the ratio of the income between members was constrained to not exceed a certain ratio.

disappearance of this security blanket, and created a situation where kibbutzim needed to fiscal

discipline, and this varied by the wealth level of the individual kibbutz. As we will demonstrate,

the variation across kibbutzim in their financial situation led to stark differences in the subsidies

provided by kibbutzim towards members, including those related to the costs of children.

Previous empirical examinations have concluded that financial incentives have a

substantial impact on fertility, with a range of elasticities estimated. These studies generally

exploit changes in government subsidies to fertility to identify the price elasticity of demand for

children (Mulligan 2005); (Laroque and Salanie 2012); (Manski and Mayshar 2003); (Cohen

Dehejia and Romanov 2013).[3] Others have concluded that the effects are more modest (Demeny

1986).[4] However, these studies, while important, generally share several drawbacks. First, many

rely on small changes to the financial incentives to childbearing, where parental incentives

change by a tiny fraction of the cost of raising a child. As such, these studies reflect decisions

made at the margin, and it may also be worthwhile to examine large changes in the cost of

childbearing, if the elasticity is not constant. Second, these studies are generally conducted by

exploiting the introduction or increase in a means-tested incentive to childbearing, where

individuals beyond a certain income or wealth level are not eligible for the subsidy. As a result,

they may be providing information relevant for only a subset of the population, and the results

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[3] Mulligan (2005) studied the effect of the introduction of a pronatalist tax policy in the Canadian province of Quebec on fertility. He estimated that the fertility of those eligible for the new program increased by 12% on average, and by 25% for those eligible for the maximum benefit. Laroque and Salanie (2012) developed a structural model of female labor force participation and fertility and used the variation in the tax-benefit system in France to identify the effect of financial incentives on fertility. They found that financial incentives play a notable role in determining fertility. Manski and Mayshar (2003) exploit changes in child subsidies to Israeli parents, finding effects of lump-sum transfers on fertility among ultra-Orthodox Ashkenazi Jews. While being careful in their inference, Manski and Mayshar (2003) write, "Other analyses of our sample data reinforce the impression that the completed fertility rates of ultra-Orthodox Ashkenazi Jews substantially increased in the period around the 1975 tax reform" (pp. 192-3). Similarly, Cohen et al. (2013) found that the mean level of child allowance accounted for a nearly 8% increase in fertility, with all of it concentrated in the bottom half of the income distribution.
[4] Demeny (1986) reviewed earlier evidence on the effect of pronatalist measures taken in Western Europe on fertility and concluded that the effects are negligible.

may not be generalizable to the overall population. Third, the data collected in large household surveys often fail to accurately capture lifetime fertility, if children have left the home or if parents have not completed fertility. Therefore, data limitations often prevent a full examination of the impact of incentives on lifetime fertility.

This study, which examines the change in fertility among the membership of Israeli kibbutzim, improves on the existing studies in several ways. First, in our study, we exploit a relatively large change in the costs associated with raising children. Prior to privatization, kibbutzim essentially insulated parents from any marginal financial costs to having an additional child. The traditional kibbutz allowed parents to have as many children as they liked, with communal resources being used for every type of expense. As such, our natural experiment represents a large shift in the financial incentives to childbearing, from close to zero to a substantial share of disposable income. Second, our study is based on a large sub-population of Israel that is broadly similar to the population in the country. The membership of kibbutzim was generally composed of descendants of Jews from Eastern Europe and Central Europe, with residents being generally similar in terms of ethnicity and family background to the other European Jews that immigrated to Israel. While their membership was somewhat more secular, they more closely represent the overall population in terms of social status than individuals eligible for means-tested incentives. Third, we exploit an arguably exogenous change to the costs of childbearing that occurred during a short period of time due to privatization (Abramitzky 2008). The magnitude of the crisis also varied widely across kibbutzim. Since wealthier kibbutzim had a presence in more profitable industries and greater financial reserves, they were markedly less likely to privatize in the wake of the crisis; as such, kibbutz wealth and per

member income has a strong first-stage relationship with a kibbutz's decision to privatize, providing us a candidate instrument for kibbutz privatization.

In this paper, we focus on a set of parents and prospective parents who were most affected by the kibbutz financial collapse and privatization, and examine how their lifetime fertility responded to the privatization of costs for children. We focus primarily on young women who were ages 25-40 at the time of the 1995 Israeli census. These cohorts presumably had their expectations shift during the early 1990s, as the kibbutzim encountered financial crisis and it became clear that the movement would not have sufficient resources to provide the lifestyle afforded to their parent's generation. We anticipate that the largest effects would be borne by those between ages 30-40 in 1995, the group which would have had most of their fertility window occur after the financial crisis, and have completed their fertility by 2008. Since it is unclear exactly when members internalized that they would no longer enjoy the full subsidies on children, we focus our analysis on fertility behavior between the two census samples, rather than annual data.[5]

In our empirical analysis, we find that privatization led to an extremely large decline in fertility among those affected. Using kibbutz wealth as an instrument for the probability of one's kibbutz privatizing, we find that fertility declined by .59 children per woman at privatized kibbutzim, after controlling for observable features of the parent such as age, education, and immigrant status. Note that this occurred during a period of slightly *increasing* fertility among the secular Jewish population of Israel, indicating that concurrent trends cannot be responsible

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[5] We have also found using aggregated fertility data by kibbutz and year that fertility declined in kibbutzim that eventually privatized in the years immediately prior to privatization. These are available from the authors upon request.

for our results (Hleihel 2011).[6] The effect is largest among those with lower human capital, suggesting that the crisis and new system of differential pay involved a more pronounced decline in the affordability of children for parents who would receive the largest income decline from the shift to differential pay. We also find that the relationship between kibbutz wealth and fertility is strongest at large kibbutzim, presumably where parents would be least likely to internalize the cost of fertility suggesting that, prior to privatization, 'free riding' was lesser at smaller kibbutzim where social pressure may have served to limit the number of children. Interestingly, we find no relationship between kibbutz wealth and fertility prior to the kibbutz financial crisis and wave of privatization, consistent with an interpretation that we are not simply capturing a correlation between kibbutz wealth and fertility associated with an income effect. Our results suggest that insulating parents from the cost of childbearing can have a very large impact on fertility. This has relevance for understanding the importance of cost considerations in fertility, and may help explain the large decline in fertility among most states of the Former Soviet Union following its collapse.[7]

We then examine the role income and fertility considerations played in people's decision to either stay or leave the kibbutz. We find a strong relationship between both income and fertility on kibbutz exit decisions, with parents of either low income or high fertility electing to stay on the kibbutz at significantly higher rates. Relative to the full sharing kibbutzim, this selection pattern became less pronounced at privatized kibbutzim, with lower responsiveness of exit to both fertility and income. One interpretation of this finding is that the 'free rider' effect of fertility in the kibbutzim forced all but the wealthiest to weaken the incentives existing in the

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[6] The total fertility rates in the general Israeli population among Jews is roughly stable between 2.9 and 3.1 children but decreased during the period 1995-2008 among ultra-religious women and rose modestly among secular women who are most similar culturally to the kibbutz population we analyze.

[7] Fertility declined below replacement in almost every country that was part of the Former Soviet Union, following its collapse. For a good summary of economic interpretations of these trends, see Billingsley (2010).

full-sharing kibbutzim. Insofar as high fertility and low income members strain the kibbutz resources, only kibbutzim with vast financial reserves would be able to keep the sharing model in place.

We also find that the fertility decline observed among parents at kibbutzim facing financial hardship was borne to a large extent by those *leaving* both the sharing and the privatized kibbutzim. This is logical, since the privatized kibbutzim still offered child services at a discounted price relative to the city. For parents with high desired fertility, staying at the privatized kibbutz would still offer financial savings over moving to the city, albeit smaller savings than before the reform. Consistent with this type of selection, we find that fertility is especially low among those who exit the sharing kibbutzim, who elected to forego fully subsidized children, and presumably had lower desired fertility than members who stayed.

In light of the striking pattern of selective exit from the kibbutz based on fertility tastes and potential income, we examine the decision of Israelis to emigrate. Relative to the United States, a common destination of Israeli emigrants, Israel offers its citizens the ability to have children at low cost, with state provision of education at all levels, and free universal health care. Similar to the kibbutz, however, Israel has higher tax rates on personal income.[8] We observe a striking similarity in the composition of those who exit the kibbutz and emigrants from Israel, with those leaving having significantly lower fertility and higher human capital than those who choose to stay. The results highlight the importance of the cost of children in migration decisions, and represents further evidence of the importance of financial considerations in the joint determination of fertility and the cost-sharing context.

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[8] http://cbs.gov.il/reader/shnaton/templ_shnaton.html?num_tab=st28_20&CYear=2010

The rest of the paper is organized as follows. In Section 2, we provide background on the kibbutz movement in Israel and the privatization process that the movement underwent. In Section 3, we describe our data set, present summary statistics, and lay out our empirical strategy. In Section 4, we present our results on the relationship between privatization and fertility, and heterogeneity across groups in their responses to privatization. In Section 5, we examine the impact of privatization on exit decisions among kibbutz members, and the role that desired fertility and potential income played in these decisions. In Section 6, we conclude.

## II.    Background

### A.    The History of the Kibbutz and its Financial Crisis

Many of the Jews who immigrated to Israel at the beginning of the 20th century were single, young, and arrived with very few or no possessions. Some of them began forming new collective settlements (kibbutzim) on land purchased with donations from Jews living abroad, and based them on the principle of perfect equality. All members forfeited their income to the kibbutz, including whatever wealth they had prior to joining and any presents or inheritance they might receive after.[9] The kibbutz, in return, distributed its resources equally among its members in the form of goods and services. All members dined in a communal dining room, received their clothes from the kibbutz and were allocated equally-sized housing units. Until the late 1960s, all of the children lived together from a very early age, first in a nursery and then in group houses for the kibbutz children. The kibbutz granted vacations, a trip abroad, and the right to use a kibbutz-owned car for short trips. Kibbutz members even voted on who would be permitted to study at university, and what academic disciplines they could pursue.

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[9] In some of the early kibbutzim marriage was forbidden as it was perceived to be unnecessary and a form of possession. The resulting conflicts convinced the members that they would be better served by allowing marriage.

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The first kibbutz *Degania Alef* was founded in 1910, ushering in a period of Jewish immigration into Palestine and the founding of many kibbutzim in the 1930s and the 1940s. At their height, they comprised about 5 percent of the Jewish population in Israel. In recent years, the share of the population living in a kibbutz has declined and their membership today is roughly 118,000 people living on 267 kibbutzim. The movement has also evolved over time, with many kibbutzim moderating in their attitudes towards private living and acquisition of private property. In the late 1960s, the kibbutzim began to gradually abolish the children houses and began to allow children to reside with their parents, with kibbutz housing being allocated according to family size. By the late 1980s, special houses for kibbutz children had been eliminated completely, and in the early 1990s, many kibbutzim began giving vouchers for food that could be used either in the communal dining room, or for purchasing groceries to be prepared at home.

The kibbutz movement experienced a severe decline in their political power in the wake of the Labor Party's defeat in 1977, which was historically affiliated to the kibbutz movement. As a result of Labor's loss of control, the kibbutzim, like many other state-sponsored sectors of the economy, lost economic privileges such as subsidized state loans and exclusive rights to growing certain profitable crops. During the early 1980s, the kibbutzim were instead forced to turn to banks to provide sufficient capital to expand housing for their member's families, and increasingly used debt to maintain the quality of their amenities (e.g. dining halls). However, in 1985, the Bank of Israel raised interest rates to control high inflation rates where at the same time the government cut drastically its subsidized loans, which through the kibbutz movement into the "kibbutzim crisis" (Abramitzky 2008).

The crisis forced each kibbutz to function independently and in a financially self-sufficient manner, abandoning the previous security provided by the national government and losing the guarantee of support from the broader kibbutz movement. This led to tremendous heterogeneity in the wealth of the kibbutzim, and in the ability of many of them to maintain their traditional lifestyle. Some kibbutzim had entered highly lucrative manufacturing industries, such as arms production, medical equipment and sophisticated agricultural equipment. Many other kibbutzim were less fortunate. As a result of poor management and excessive debt burdens, they faced crisis. These kibbutzim were forced to trim expenses aggressively, including those related to subsidized child care.

In the mid-1990s, the kibbutzim were granted permission from the movements to begin a process of "privatization" to stabilize their finances. Each kibbutz was authorized to hold a vote wherein the membership would choose whether to keep the existing system of shared living costs in place, or to move to a privatized system where families would be responsible for their own cost of living, and earn private income. Privatized kibbutzim pay differential salaries in their enterprises, and allow members to work outside the kibbutz, with only a proportion of their external income (typically around 10%) appropriated by the collective. Privatization also requires each member to pay for food, clothing and housing, though often at subsidized rates, with the subsidy varying by kibbutz.[10] Hence, whereas before privatization there was very little material cost of raising children, after privatization the family bore almost the entire cost of children, with the exception of services that continued to be provided by the state, such as education and health care. The privatized kibbutzim maintained a set of free or subsidized services for children, but the level of generosity was highly correlated with the individual

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[10] While most kibbutzim granted residents ownership over their current housing at the time of privatization, families were no longer provided additional free housing upon the birth of a child.

kibbutz financial situation, with only the richest kibbutzim leaving in place the full subsidy. As we will demonstrate, kibbutz financial wealth represented an important factor predicting whether a kibbutz privatized, and the degree of cost sharing among members.

**B.      Was Privatization Exogenous to Fertility Tastes?**

In an ideal situation, the econometrician would randomly assign the economic organization type (fully-sharing versus privatized) across kibbutzim and compare fertility among the two groups. Unfortunately, this is not the case, and a key challenge to our study is to assess whether privatization can be treated as exogenous to the fertility tastes of its members. As we will describe, it is unlikely that privatization was random, and so an instrumental variables strategy is required.

The process of privatization, which began in 1996, was rapid. For a kibbutz to privatize, 75% of the adult members had to agree to the switch. While in 1995, all of the kibbutzim were fully sharing, by 2005, 70% of the kibbutzim were privatized (see Figure A1). The rapid adoption of the new policy regime is beneficial to our identification strategy, as it makes it less likely that other concurrent trends materially affected the financial cost to childbearing. We are also able to observe for a subset of kibbutzim the exact vote share in favor of privatization.[11] If many kibbutzim converted with relatively close votes on this matter, the privatization outcome can be thought to have a random component, consistent with a view that privatization is not strongly correlated with the fertility tastes of the membership. Indeed, the vote shares shown in

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[11] These data were collected through direct phone calls and emails to kibbutzim, of which a subset had recorded the vote share and provided us the exact share in favor of privatization. The majority of kibbutzim, unfortunately, did not make these data available to us.

Figure A2 are suggestive that, to some extent, privatization was controversial.[12] However, the potential correlation between fertility preferences cannot be ruled out, and suggests that the use of an instrument is necessary to evaluate the impact of privatization.

In this paper, we use measured kibbutz wealth as of 2001 as an instrument for privatization. As we will show in the empirical results, kibbutz wealth has a very strong first stage relationship with the probability of privatization, with wealthier kibbutzim avoiding privatization either entirely or for a full decade after the crisis (Abramitzky, 2008). Insofar as variation in kibbutz wealth is primarily driven by factors exogenous to fertility tastes, such as the kibbutz's industrial profits, this strategy is reasonable. However, if kibbutz wealth directly affects fertility demand, this will invalidate our instrument.

In the context of this discussion, we think it is important to distinguish between the classical income effect that operated on an individual's fertility choice, versus the impact that shared kibbutz wealth would have on its members. The classical income effect predicts a positive relationship between *private* wealth and fertility because, given their budget constraint, parents forego consumption due to the cost of additional child. Richer households may afford more of both children and consumption goods. In the traditional kibbutz, however, there is no tradeoff between children and other consumption goods, at least not from the perspective of the individual household, since the cost of children is borne by the entire kibbutz. Indeed, it may be that households living in a wealthier kibbutz consume more of all the other goods, but having another child does not entail giving up consumption of other goods, as a result of firm adherence

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[12] Discussions with kibbutz administrators suggest that the privatization initiative was more critical to the elderly, who feared a total collapse of the kibbutz would leave them having no formal pensions and a massive exodus from the kibbutz. In this sense, the privatization vote was an effort to reach a compromise where childbearing couples would receive limited differential wages and continue to receive partially-subsidized child services to prevent their exit.

to the socialist credo that each member should receive 'according to his needs'. Viewed in this light, it is clear that the classic income effect should not operate in our context.

However, it may be that shared kibbutz wealth *does* affect fertility demand directly. Shared kibbutz wealth would affect fertility if, for example, kibbutz wealth enabled the purchase of public amenities that had complementarities with children. For example, a swimming pool may make children more attractive to parents. In this context, we would observe a relationship between kibbutz wealth and fertility that was not related to the impact of privatization on fertility, invalidating our instrument. This can be examined empirically, since we observe both kibbutz wealth and fertility in the period prior to privatization, where the classical income effect would not have operated. Therefore, we ideally would compare the elasticity of fertility to kibbutz wealth before and after the privatization movement to evaluate the relevance of this potential concern regarding our instrument. If shared kibbutz wealth affects fertility, it would presumably be correlated with the fertility of both old and young women, whereas if the relationship between kibbutz wealth and fertility was driven by privatization, it would only be correlated with fertility of the young women.

In Figure 2, we examine the relationship between kibbutz wealth and average fertility across the kibbutzim for both young and old women. The younger cohorts were ages 25 to 40 in 1995, which was several years prior to privatization. In our "control" group, we observe older women, who were ages 50 to 75 in 1995, implying they completed their fertility prior to any anticipation of privatization. As predicted, we find a strong positive relationship (p=0.042) between kibbutz wealth and fertility among young women but almost no relationship for older women (p=0.49). This is suggestive evidence in support of our instrument, but we will explore this issue in greater detail in the empirical results, including estimation of models with kibbutz

fixed effects and placebo exercises examining cohorts of women who should not have been affected by kibbutz wealth.

Finally, note that our reliance on kibbutz wealth as our instrument implies that we are essentially identifying a local average treatment effect, with the effect of privatization being estimated for kibbutzim induced to privatize due to financial considerations, rather than other factors that might have led to privatization (Imbens and Angrist 1994).[13] In this sense, our IV estimates are capturing the fertility decline associated with a "forced" privatization, which may have a larger impact on fertility than privatization related to (for example) a dis-preference for income sharing in general.[14]

### III.    Data and Empirical Strategy

### A.    Data

Our sample is composed of a set of individuals found on kibbutzim in the 1995 census, ages 25-75. The census data also provides a rich set of demographic information including whether the individual has graduated college, individual pay (in 2008), occupation, immigrant status, and marital status. Note that unlike in census data for the United States (post 1990), we observe all children ever born, even if they no longer co-reside with their parents. Table 1 presents summary statistics for two groups of cohorts of kibbutz members, stratified by their age in 1995 and by whether they were living on a kibbutz that eventually privatized. The first group, kibbutz members ages 25-40, was young enough to adjust their fertility in response to privatization whereas the older group, ages 50-75, had already completed their fertility. As

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[13] Note that this interpretation additionally requires monotonicity, meaning that wealth only exerted a negative probability on the impact of privatization (Imbens and Angrist 1994).

[14] Some argue that the high tech boom in Israel in the late 1990s led to an increase in the differential wages available in Israeli cities, pressuring the kibbutzim to allow for differential salaries among member to retain members who would be able to earn high salaries in the technology sector. This pressure did not exist in the 1960s and 1970s, where pay in Israel had lower inequality.

shown in Table 1, the membership in the kibbutzim that eventually privatized was relatively similar to the population in the kibbutzim that were able to remain sharing kibbutzim along the primary dimensions that one would expect to be correlated with fertility such as age, education and immigrant status. It is worth noting that other life decisions, such as those related to human capital formation (Abramitzky and Lavy 2012), may have also been affected by privatization and the resulting increase in returns to education. However, the table provides suggestive evidence that prior to privatization the demographic characteristics of the membership at sharing and privatized kibbutzim was broadly similar, both among the younger and older cohorts. One difference that is observed between the two sets of kibbutzim is that we observe somewhat higher exit rates from kibbutzim that privatized: 28% versus 23% for the younger cohort, possibly owing to the better financial condition of kibbutzim that were not forced to privatize costs, or because privatization implied that members had to re-evaluate whether they wanted to be part of the kibbutz under these new terms.

We also observe a set of kibbutz-level variables that we assigned to our individual membership data. These include the financial wealth of the kibbutz in 2001, the timing of privatization, the ideological movement that the kibbutz is associated with, the region where the kibbutz is located, and the year it was established.[15] As expected, the results reflect a large difference in financial wealth among kibbutzim that never privatized. We also observe that *Artzi* kibbutzim, which had a stronger leftist orientation on ideological grounds than other movements (e.g. those affiliated with *Takam*), had lower rates of privatization. Lastly, we observe that older

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[15] Since the erosion of the kibbutz position, the government has routinely appointed an advisor to monitor their solvency. The financial information on the kibbutz was obtained from Yisrael Oz, the current trustee of the kibbutz financial situation. We are greatly indebted to Yisrael Oz for making these data available to us.

kibbutzim are somewhat less likely to be privatized, presumably because they are more ideological and wealthier than the kibbutzim established more recently.[16]

## B. Empirical Strategy

Our strategy is to estimate OLS and 2SLS models where we examine fertility responses to privatization. In the simplest specification, we compare fertility among individuals at kibbutzim privatizing versus those that did not.

$$k_i = \alpha + \beta P_j + \Lambda x_i + \varepsilon_{ij} \qquad (1)$$

where $k_i$ is the number of children ever born to woman $i$ at kibbutz $j$, $x_i$ includes years of education and other observable factors that may affect fertility, and $P_j$ is a dummy variable that take the value 1 if kibbutz $j$ ever privatized and 0 otherwise. For reasons discussed in the previous section, we treat the privatization outcome as endogenous to fertility considerations, and exploit its relationship with kibbutz wealth, denoted $W_j$.

This produces a first-stage specification of the following form:

$$P_j = \alpha + \delta W_j + \Lambda x_i + u_{ij} \qquad (2)$$

We also present estimates of the direct relationship between wealth and fertility (3), and our main specification of 2SLS estimates (4) using the fitted values from (2).

$$k_j = \alpha + \gamma W_j + \Lambda x_i + v_{ij} \qquad (3)$$

$$k_i = \alpha + \gamma P_j + \Lambda x_i + v_{ij} \qquad (4)$$

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[16] Note that older kibbutzim also generally had larger plots of land and stronger ties to the government funding sources.

Our main identifying assumptions are the standard requirements for IV estimation. In this context, this requires that kibbutz wealth is not correlated with fertility tastes at the kibbutz, and that kibbutz wealth affects fertility only through the mechanism of forcing the kibbutz to privatize. As stated earlier, the similarity of the kibbutz members at kibbutzim that eventually privatized and those that did not, indicates that our first assumption is most likely satisfied. However, the second assumption is more problematic. If kibbutz wealth is capturing other variation in the price of children and *not* simply affecting fertility through pressuring kibbutzim to privatize, our 2SLS estimates may be biased. The possibility that kibbutz wealth directly affects fertility other than through privatization is discussed extensively in the background section, and will be examined empirically in the next section.

## IV.      Privatization, Kibbutz Wealth, and Fertility

In this section, we examine the relationship between the increased cost of childbearing and fertility, exploiting variation in the intensity of the kibbutz financial crisis. We posit that wealthier kibbutzim would have been more able to protect members from the increased costs related to children that followed the privatization process. We reported evidence in Figure 2 consistent with an interpretation that the mechanism by which kibbutz wealth affected fertility was through the mechanism of increased cost sharing. We investigate the relationship between fertility, kibbutz wealth, and privatization more rigorously in Table 2.

### A.      Basic Results

In Table 2, we present our results from estimating equations (1)-(4). In each regression, we include individual controls for a cubic in age, college degree, immigrant status, and controls

that vary by kibbutz, including kibbutz size, ideological movement, and location. We present the results stratified by age in the 1995 census, as we have a prior that individuals in their late 20s and early 30s would be most affected by the late 1980s financial crisis at the kibbutzim. These cohorts experienced the decline in kibbutz wealth and would have nearly completed fertility by 2008, which is the last year in our data. These parents and prospective parents would also likely be choosing between having the "marginal" child at this point in their lives. For example, in our sample where average fertility is roughly 3, many parents were presumably considering having a third child in their late 30s. The change likely forced them to consider raising the costs of the two children they already had under the presumption that all costs related to children would be covered by the kibbutz. As such, it is likely that some parents were dissuaded from additional fertility due to the crisis.

In Panel A, we present our results using OLS of the impact of privatization. We restrict our sample to ever-married women living on a kibbutz, who would be most likely to have their fertility to respond to privatization. The results indicate a statistically significant relationship between privatization and fertility, with the pattern across age groups consistent with an interpretation that the most affected cohorts were those beginning their prime fertility window at the time of the kibbutz financial crisis. Specifically, our OLS estimates indicate that those ages 35-39 had -.21 fewer children than their counterparts at kibbutzim that never privatized. However, these results are difficult to interpret as causal; since privatization was a decision made by the membership, it is likely endogenous to desired fertility. Another challenge in interpreting the OLS results is that privatization may have involved regime changes not observed by the econometrician. For example, some privatized kibbutzim kept the communal dining hall free or heavily subsidized for members, implying that food remained free, whereas others did not.

Insofar as we cannot observe these decisions, privatization of costs will be measured with error and the OLS results will understate the magnitude of the fertility response to the reform.

In Panel B, we present the results of the first-stage relationship between privatization and kibbutz wealth. As anticipated, we find that wealthier kibbutzim were significantly less likely to privatize, with the effect observed across the age groups.[17] Note that the $R^2$ suggests that privatization was considerably affected by the wealth situation, though there is substantial heterogeneity in privatization not accounted for. The membership's preferences for sharing were presumably also very important in determining privatization, as some kibbutzim clung to the old model in spite of financial hardship, and less tightly-knit kibbutzim wanted to reform to prevent exit from the kibbutz.

In Panel C, we present the reduced form relationship between kibbutz wealth and fertility. The results indicated a marked relationship, with wealthier kibbutzim having higher fertility. Each additional log point in kibbutz wealth is associated with additional .065 and .072 children among those ages 30-34 and 35-39 respectively. The effects are largest among those in their peak fertility windows, with more modest effects observed among those ages 25-29 and ages 40-44. This is logical, as many of the older cohorts would have already completed fertility by the time of the crisis, and some of the younger cohorts may not have completed fertility by the 2008 census (when they would have been 38-43 years old). An alternative explanation for a small effect in the younger group is that the impact of the "shock" of privatization in the 1990s had a larger effect than later, when parents could adjust their planning and human capital

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[17] In a set of robustness checks, we use alternative measures of the kibbutz' financial situation and find our results are not very sensitive to the chosen measure of the kibbutz' exposure to the financial crisis. In results available upon request, we use the kibbutz income in 2001 and the kibbutz ability to repay its debt, as of 1994, as determined by the trustee of the kibbutz financial situation. Both measures produce similar to the results presented here. We use wealth because it is a better reflection of the kibbutz' situation than income (which is more variable) and it is available for a larger group of kibbutzim than the debt payment of the kibbutz (which is only available for roughly half the kibbutzim).

formation decisions knowing that they would be living in a privatized kibbutz (Abramitzky and Lavy 2012).

In Panel D, we present our 2SLS results using financial wealth as an instrument for the probability of a kibbutz privatizing. The results indicate a marked decline in fertility due to privatization. We estimate that among those ages 30-34 and 35-39, the privatization led to an average fertility decline of .65 and 0.59 children respectively, with somewhat weaker results for those ages 40-44, who experienced declines of 0.39 children, and mirroring the patterns in the reduced form results shown in Panel C. This result indicates that among parents in the peak affected age group (35-39), fertility dropped by roughly 20% relative to the 3 child average in the sample. Note that this is much larger than our OLS results. We offer three possible explanations. The first possibility is that kibbutzim that were forced to privatize due to financial hardship experienced larger fertility declines than kibbutzim that elected to privatize due to, for example, dis-preference for income sharing. The second possibility is that privatization is a crude measure of the privatization of costs, missing the elements of cost-shifting that is likely very correlated with kibbutz wealth, and so the 2SLS estimates suffer less attenuation bias. A third possibility is that privatization is endogenous, and may have occurred with higher frequency at kibbutzim with higher-than-average fertility in that cohort. So, for example, if kibbutzim with high desired fertility were forced to privatize earlier, OLS would understate the true casual impact of privatization on fertility.


## B.      Heterogeneity by Potential Income

Due to the innovation of differential pay at the kibbutz, privatization also raised the price of children by raising the value of time. Prior to the reform, time spent with children implied no

foregone consumption. After the reform, this was no longer true. Privatization also had a differential impact on parents with different levels of human capital, both by raising the opportunity cost of time from essentially zero and by allowing parents to keep more of their private income. For parents with above kibbutz average human capital, they experienced an increase in the price of child services and a large increase in the opportunity cost of their time, but benefited from the differential pay allocation. However, for parents with below kibbutz average human capital, they experienced *both* an increase in the price of raising children and a decline in their income, providing an unambiguous prediction that fertility would decline for this group. As presented in Panel A of Table 3, these predictions are largely borne out by the data, with massive effects observed for the kibbutz membership without a college degree, and more modest effects from individuals whose income increased due to the privatization of the kibbutz. Fertility declined by .81 children among those without a college degree in the 30-34 age group, and a more modest .35 decline among those with a degree. One explanation is that selection had existed prior to the reform, and the kibbutz was a particularly desirable place to have children among those who would earn less by moving to the city, since they would be shielded most by the sharing of costs. The second explanation is that the treatment effect of the imposition of private prices on children and reduced income sharing led reduced fertility.

## C. Heterogeneity by Kibbutz Size and the 'Free Rider' Effect

If the privatization of costs associated with raising children is what led to the decline in fertility after the reform, it stands to reason that the magnitude of this effect should be largest at larger kibbutzim. The smaller kibbutzim were presumably more able to socially pressure parents to not have very large families, since these costs would be borne by the other members. As such,

the reform should have represented the largest change in incentives at large kibbutzim. In order to examine this, we stratify the sample based on whether an individual woman lived at a kibbutz above or below the median kibbutz size, the results in Panel B of Table 3 indicate that the IV estimates are indeed largest at large kibbutzim. We estimate that among those ages 30-34, privatization reduced fertility by .77 at large kibbutzim, but increased by a very small and insignificant amount (.16) at smaller kibbutzim. Interestingly, none of our results are statistically significant at the smaller kibbutzim but are significant and large at the larger kibbutzim. This is consistent with an interpretation that privatization was necessary to prevent the 'free rider' effect of people having large families in response to not bearing financial costs of doing so, and not facing social pressure to restrain their fertility.

### D.     Privatization and Age at First Birth

Lower completed fertility can be a result of several different decisions. First, women can postpone entering motherhood until older ages, which may result in fewer total lifetime births. Second, some women can explicitly choose to forego a last "marginal" child. We anticipate that the decline in fertility from the privatization of the kibbutz should only have operated through this second channel. In order to examine this, we present in Table 4 the same regressions as in Table 2 but replace the outcome variable to the age at first birth. The results indicate that age at first birth is unaffected by privatization, suggesting that the effect we found in Table 2 comes from a decision to give up on the marginal child. In addition, the results in Table 4 are reassuring that we compare women with similar characteristics since women in their 30s presumably already had children when the process of privatization began. It also corroborates our view that privatization was not anticipated by most women in the early 1990s; had women anticipated

privatization, it would have presumably induced some women to delay their first child, in light of lower expected total lifetime fertility.

**E.      Placebo Test Using the Kibbutz Post-Fertility Population**

A key challenge in our study is that kibbutz wealth is highly correlated with the price of children, but also may be capturing an income effect. As discussed previously, there is considerable qualitative evidence that the privatization's reforms were largely related to increasing cost sharing among parents, and not related to an income effect.  However, as a falsification exercise, we examine the correlation between kibbutz wealth and fertility among older kibbutz residents who had already completed fertility. Presumably, an income effect would operate in a similar manner before and after the reform, suggesting that regressing kibbutz wealth on fertility among the population with completed fertility represents a natural way of examining the importance of income effects in this context. In Table 5, we present the same regressions as in Table 2, except that here we study these correlations for women who were at least 50 years old in 1995. Although fertility is somewhat lower among women living in kibbutzim that later privatized, the magnitude is much smaller, about a third of the OLS results compared to Table 2, and are not significant for any of the cohorts. This is consistent with an interpretation that our main results are capturing the price effect of the reform, which did not have any bearing on the prices faced by those ages 50-74. It seems unlikely that the relationship between kibbutz wealth and fertility would change so dramatically after the reform, if it did not occur through the mechanism of the privatization of costs of childbearing.

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## VI. Differences in Differences

In this section, we present an alternative specification where we estimate the impact of privatization on fertility in a differences in differences (DID) setup, where we use older cohorts as a control group. This enables us to consider models which include kibbutz fixed effects, which would absorb unobserved time-invariant features of a kibbutz. In order to estimate these models, we include all women who are ages 25-40 as our young cohort, and women ages 50-74 as the control group. In this set-up, the treated group is being a young woman living in a kibbutz which later privatizes. Note that in order to have sufficient observations to estimate these models, we pool women who are at different stages in their fertility cycles. Among our younger women, for example, those in their early 20s in 1995 may not have completed fertility by 2008. Among those nearing 40 in 1995, some made their fertility decisions unaware of the impending financial collapse at the kibbutzim. Both factors suggest that the coefficient estimates in this exercise will be smaller than our baseline results. However, evidence that fertility fell using a fixed effects strategy contributes to the evidence that privatization reduced fertility.

In Table 6, we present the results of the DID regressions for both pooled OLS (column 1) and a model with kibbutz fixed effects (column 2). In each specification, we regress each woman's fertility in 2008 on a dummy indicator for her being young in 1995 (ages 25-40), a dummy indicator for her living on kibbutz that eventually privatized, and an interaction of the two, in addition to control variables from the main specifications. Our coefficient of interest here is the interaction of being a young woman at a kibbutz that privatized. In the first specification, we observe that kibbutzim that eventually privatized had lower fertility (-.108), and younger women had lower fertility (-.313), and the interaction of the two variables is also negative (-.077), and statistically significant at the 5% level. In our preferred specification with kibbutz

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fixed effects, we observe that fertility declines by -.104 children at the kibbutzim that privatized, significant at the 1% level. While the magnitude of this estimate is smaller than our main results, this may be due to the aforementioned pooling of women across different age groups, who may have lower elasticity of demand. This result, however, corroborates our main findings that privatization resulted in a significant decline in fertility among the affected women.

## V.      Wages, Fertility, and Exit from the Kibbutz

In the wake of the financial crisis, the kibbutzim experienced a large exodus between 1995 and 2008. The patterns of entry and exit at the kibbutzim, and the relationship with an individual's productivity, are richly described by Abramitzky (2008). As predicted by a simple Roy model, Borjas (1987) argues that immigration results in higher skilled individuals sorting into countries with higher returns to skill. Abramitzky argues that this fits the pattern observed at the kibbutzim very well, as they struggled to prevent the exit of their most skilled members in his sample, which was between the census surveys in 1983 and 1995. We use this framework but add in the fertility dimension to the model. For young parents, a salient feature of the kibbutz was the collective bearing the burden of expenses related to children. Insofar as individuals vary in both their productivity *and* their desired fertility, the decision to exit the kibbutz may be related to the anticipated costs of fertility. This type of sorting implies that focusing narrowly on the response of fertility to taking price as given fails to capture the full relationship between fertility and prices. Examining mobility in and out of the kibbutz provides a unique opportunity to observe people choosing the price they will face for children. In Figure 3, we present a hypothetical relationship between entry and exit from the kibbutz in which members are choosing whether to leave the kibbutz based on their potential wage and their desired fertility. As

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displayed in the figure, we posit that individuals with high wages and low desired fertility will be most likely to leave the kibbutz, as they will lose the most from income sharing and benefit least from subsidized child costs. Conversely, those staying at the kibbutz will be those who provide the least to the public budget constraint – low income and high fertility couples. As shown in Figure 4, this simple model may capture an important element of the decision making among young parents and prospective parents. We plot the matrix of income/fertility combinations and the exit rates from each cell for both the sharing kibbutzim and the privatized kibbutzim. While the plot would ideally report potential income instead of realized income, these are presumably highly correlated and couples know their income potential and fertility preferences when making decisions to leave the kibbutz. High income and low fertility couples are most likely to exit, and low income/high fertility couples most likely to stay at both sharing and privatized kibbutzim. But the pattern is particularly striking at the sharing kibbutzim, where we observe exit rates rising sharply with individual income and falling with fertility. The privatized kibbutzim exhibit a similar pattern, but the incentives appear much weaker, with the probability of exit changing more modestly with respect to both fertility and income. This is logical, as the privatized kibbutzim allowed individuals to keep more of their income but offered lower subsidies on child costs. This "watered down" kibbutz is characterized by relatively lower exit rates of highly productive and low fertility individuals.

This pattern is also reflected in the regression results shown in Table 7, which presents the regression analogue of Figure 4. In the regression, we include kibbutz fixed effects and examine how the probability of exit is affected by an individual's realized income and total lifetime fertility in 2008, after controlling for the available demographic covariates. We estimate that each child reduces exit probability by 8.8 percentage points from sharing kibbutzim and 4.3

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percentage points from privatized kibbutzim. The exit probabilities are also more steeply increasing with respect to individual income at the sharing kibbutzim. A 1 log point increase in income increases exit probability by 6.5 percentage points at sharing kibbutzim, and 4.9 percentage points at privatized kibbutzim. Note that the relative importance of children for exit at the sharing kibbutzim is larger than at the privatized kibbutzim. The ratio of the coefficients for children versus income considerations is greater than 1 (8.8/6.5) at the sharing kibbutzim, but considerably lower than 1 (4.3/4.9) at the privatized kibbutzim. This is striking, and suggests that the heavily subsidized fertility was an important consideration in people's exit decisions. It is also worth noting that the results show stronger effects on exit probability of income for men and fertility for women. This may be related to women factoring in husband's income when making exit decisions and so the smaller coefficient is related to a smaller share of household income. It also may reflect stronger preferences with respect to desired fertility than consumption.

We examine the characteristics of who stays and leaves the kibbutzim in greater depth in Table 8. The results highlight key differences across the two groups indicating that fertility preferences may be importantly linked to the decision to exit the kibbutz. First, it is worth noting that leavers have fewer children than stayers, both at the sharing and privatized kibbutzim. We also observe higher individual income among leavers than stayers at both types. This is logical, as both kibbutz types offered cheaper-than-city child services but higher-than-city tax rates on income. Second, fertility is lowest among those who leave a sharing kibbutz, even lower than among those who left the privatized kibbutz. This is also logical, since only those with very low desired fertility (or very high potential income) would leave a sharing kibbutz. Since those who leave the sharing kibbutz and those who leave the privatized kibbutz both end up facing the city prices for fertility, this difference in average fertility between the two groups can only be due to

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selection and not prices. However, since these individuals may be leaving the sharing kibbutz for reasons other than concerns over the prices of raising children, such as for income opportunities or a dis-preference for sharing, this evidence is only suggestive.

In order to further examine the relevance of our hypothesized model of exit behavior from the kibbutz, we analyze the decisions of Israelis to emigrate in Table 9. Like a kibbutz, Israel offers its residents highly subsidized fertility and relatively low income inequality. A pressing issue in Israel is the exit of talented individuals, who can earn relatively higher after-tax wages in the United States (Gould and Moav 2007). However, fertility is also more costly in the US, since the state does not provide the same levels of subsidy in health care and education.[18] As observed in Table 8, those who exit Israel are more educated but have lower fertility than those who stay in Israel. We observe that each child reduces the probability of leaving Israel by 0.34 percent, whereas each year of education increases the probability by 0.11 percent. Interestingly, this pattern has become more striking in the last several decades, as rising wage inequality in the US presumably led to an even stronger selection effect among the most talented Israelis. For example, among individuals born in the 1960s, each year of education increases exit probability by 0.48 percent, whereas each child reduces the probability by 0.26 percent. While most discussion of Israeli emigration focuses on the high human capital of this group, they are clearly lower fertility than those who stay as well (Gould and Moav 2007). As shown graphically in Figure 5, those who stay in Israel are of lower human capital and higher fertility than those who emigrate, very similar to how kibbutz residents compare to those who exit. While we cannot fully rule out that parents are selecting only based on earnings potential, and fertility tastes are

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[18] Note that many Israeli Jews send their children to religious schools that are funded by the state. In the United States, private Jewish schools are very expensive, and so for parents who would not use the US public schools, the difference in costs of schooling is large.

strongly correlated with earnings, the result presents suggestive evidence that fertility considerations are important in the emigration decision.

## VI.   Conclusion

This paper has examined the privatization of Israeli kibbutzim and the impact of the reform on fertility and the importance of fertility consideration in the entry and exit of its membership. In our analysis, we exploit the large impact of kibbutz wealth on the decision to privatize and the degree of cost sharing forced among young parents. Specifically, wealthier kibbutzim were able to leave the generous subsidies in place, and able in some circumstances to avoid privatization altogether. This rapid transformation in the late 1990s and early 2000s provides a 'natural experiment' to observe the impact of a large increase in the price of children on fertility. We present evidence that privatizing the costs of childbearing has a large impact on fertility, with fertility falling by 0.59 children among young parents, or roughly 20% relative to the 3 child mean in the sample. We find the largest effect among those who had low human capital, and would be most adversely affected financially by the reform which also led to differential wages. The effects on fertility are also larger at bigger kibbutzim, where social pressure to curb fertility would presumably be lowest and the need for financial incentive mechanisms, such as prices, would be greatest.

We complement our analysis of fertility responses to privatization by examining how young parents and prospective parents make entry and exit decisions. Specifically, we expand on Abramitzky (2009), who presents evidence in favor of the Borjas (1987) selection model, and considers how children affect the decisions of couples to stay or leave the collective. Our results indicate that children are an important consideration, and this is especially true among the

sharing kibbutzim, where children were essentially free. High fertility and low productivity members were most likely to stay at the kibbutzim, pressuring the kibbutzim financially and forcing all but the wealthiest to privatize costs to diminish the exit of low fertility and high productivity members. This pattern is also found among Israeli emigrants, who are often of higher income and lower fertility than those who stay, putting pressure on the national budget.

We interpret the results as indicating that the kibbutz privatization initiative was at least motivated by stabilizing the kibbutz population and preventing the 'free riding' observed at the full-sharing kibbutz. Only at wealthy kibbutzim could this "death spiral" be prevented, as the kibbutz's capital provided for a system of sufficient generosity that made staying attractive. Our study builds on existing scholarship that has found mixed results regarding the importance of price in fertility decisions, and indicates that very large price changes on fertility can have very large effects. We interpret this as evidence of the economic nature of fertility decisions, emphasizing the role of incentives relative to other factors, such as culture. Our results also highlight the endogeneity of cost-sharing regimes vis-à-vis children, as voters in democratic countries may be choosing the price of children to suit the tastes of their citizenry.

# References

Abramitzky, Ran. 2008. "The Limits of Equality: Insights from the Israeli Kibbutz." *Quarterly Journal of Economics,* 123(3):1111-1159.

Abramitzky, Ran. 2009. "The Effect of Redistribution on Migration: Evidence from the Israeli kibbutz." *Journal of Public Economics*, 93, 498-511.

Abramitzky, Ran. 2011. "Lessons from the Kibbutz on the Equality-Incentives Trade-off." *Journal of Economic Perspectives* 25(1):185-208.

Abramitzky, Ran and Victor Lavy. 2012. "How Responsive is Investment in Schooling to Changes in Redistribution Policies and in Returns?" Unpublished manuscript.

Becker, Gary S. 1960. "An Economic Analysis of Fertility." Demographic and Economic Change in Developed Countries: Princeton, NJ: Princeton University Press. 209-231.

Ben-Porath, Yoram. 1973. "Economic Analysis of Fertility in Israel." Economics of the Family: Marriage, Children, and Human Capital. National Bureau of Economic Research.

Ben-Ya'ar, Eliezer, 2000. "Kibbutzim and Israeli Society." Open University, Tel-Aviv.

Billingsley, Sunnee. 2010. "The Post-Communist Fertility Puzzle". *Population Research and Policy Review* 29:193-231.

Borjas, George J, 1987. "Self-Selection and the Earnings of Immigrants," *American Economic Review* 77(4): 531-553.

Cohen, Alma, Rajeev Dehejia, and Dmitri Romanov. 2013. "Do Financial Incentives Affect Fertility?" *Review of Economics and Statistics*, 2013(1):1-20.

Demeny, Paul. 1986. "Pronatalist Policies in Low-Fertility Countries: Patterns, Performance, and Prospects." *Population and Development Review*, 12:(335--358).

Ebenstein, Avraham. 2010. "The 'Missing Girls' of China and the Unintended Consequences of the One Child Policy." *Journal of Human Resources*, 45(1):87-115.

Gould, Eric and Omer Moav. 2007. "Israel's Brain Drain". *Israel Economic Review* 5(1):1-22.

Hleihel, Ahmad. 2011. "Fertility among Jewish and Muslim Women in Israel, by Level of Religiosity, 1979-2009." Israel Central Bureau of Statistics, Demography and Census Department. Working Paper Series #60. Downloaded at:

http://cbs.gov.il/www/publications/pw60.pdf

Imbens, G. W., & Angrist, J. D. 1994. "Identification and estimation of local average treatment effects." *Econometrica*, 62(2), 467-475.

Laroque, Guy and Bernard Salanie. 2012. "Identifying the Response of Fertility to Financial Incentives." *Journal of Applied Econometrics*, doi: 10.1002/jae.2332.

Manski, Charles F. and Joram Mayshar. 2003. "Private Incentives and Social Interactions: Fertility Puzzles in Israel." *Journal of the European Economic Association*, 1(1):181--211.

Mulligan, Kevin. 2005. "Subsidizing the Stork: New Evidence on Tax Incentives and Fertility." *Review of Economics and Statistics*, 87:539-555.

Plessner, Yakir. 1994. "The political economy of Israel: from ideology to stagnation." Albany, New York. State University of NY Press.

Russell, Raymond, Robert Hanneman, and Shlomo Getz. 2013."The Transformation of the Kibbutzim." *Indiana University Press.*

Schwartz, Moshe. 1995. "Unlimited guaranties: history, political economy, and the crisis of cooperative agriculture in Israel." Ben-Gurion University of the Negev Press, Beer-Sheva, (in Hebrew).

"Kibbutz movement." *Encyclopedia Judaica* 2nd ed. 2006. Print.

**Table 1**

Sample Statistics among Ever-Married Kibbutz Members

| | Ages 25-40 | | Ages 50-75 | |
| --- | --- | --- | --- | --- |
| | Sharing Kibbutzim | Private Kibbutzim | Sharing Kibbutzim | Private Kibbutzim |
| | **(1)** | **(2)** | **(3)** | **(4)** |
| *Panel A: Individual Characteristics* | | | | |
| Age | 33.83 | 33.93 | 58.85 | 59.40 |
| | (4.17) | (4.22) | (6.68) | (7.16) |
| Male (1=yes) | 0.45 | 0.44 | 0.49 | 0.48 |
| | (0.50) | (0.50) | (0.50) | (0.50) |
| Degree (1=yes) | 0.35 | 0.34 | 0.08 | 0.07 |
| | (0.01) | (0.01) | (0.28) | (0.26) |
| Immigrant (1=yes) | 0.29 | 0.27 | 0.49 | 0.56 |
| | (0.45) | (0.44) | (0.50) | (0.50) |
| Years of Education | 13.79 | 13.74 | 12.45 | 12.21 |
| | (2.33) | (2.27) | (3.13) | (3.21) |
| Children | 3.01 | 2.96 | 3.11 | 3.02 |
| | (0.97) | (0.98) | (1.32) | (1.35) |
| Personal Income in 2008 (log 000s) | 4.34 | 4.50 | 3.55 | 3.40 |
| | (1.29) | (1.13) | (1.46) | (1.46) |
| Left the Kibbutz (1=yes) | 0.23 | 0.28 | 0.03 | 0.04 |
| | (0.42) | (0.45) | (0.17) | (0.20) |
| *Panel B: Kibbutz Characteristics* | | | | |
| Kibbutz Wealth in 2001 (log 000s) | 9.40 | 8.73 | 9.48 | 8.76 |
| | (1.11) | (0.97) | (1.06) | (0.95) |
| Kibbutz Population | 593.98 | 486.74 | 614.97 | 559.27 |
| | (251.47) | (238.38) | (223.31) | (245.35) |
| Year of Establishment | 1944.29 | 1944.73 | 1939.22 | 1939.84 |
| | (15.13) | (14.07) | (11.50) | (10.53) |
| Artzi (1=yes) | 0.39 | 0.28 | 0.49 | 0.33 |
| | (0.49) | (0.45) | (0.50) | (0.47) |
| Central (1=yes) | 0.13 | 0.20 | 0.12 | 0.20 |
| | (0.34) | (0.40) | (0.32) | (0.40) |
| Observations | 5,298 | 9,768 | 5,197 | 9,891 |

*Source*: Israel Central Bureau of Statistics (1995, 2008), Kibbutz Research Center of Haifa (1995-2005)

*Notes*: Sample is composed of individuals ever married ages 25-40 and 50-75 in the 1995 census living on a kibbutz. A kibbutz is classifed as private if it privatized any year prior to 2005. Age and status as being a new immigrant are taken from the 1995 census, and children is taken from the 2008 census. Central area includes the area near Tel Aviv and Jerusalem. Religious kibbutz members are excluded.

**Table 2**

OLS and 2SLS Models of the Relationship between Fertility and Privatization

|  | Ages 25-29 | Ages 30-34 | Ages 35-39 | Ages 40-44 | Ages 45-49 |
|---|---|---|---|---|---|
| *Panel A: OLS Models of the Impact of Privatization on Fertility* | | | | | |
|  | -0.209*** | -0.161*** | -0.208*** | -0.106** | -0.138*** |
|  | (0.073) | (0.054) | (0.052) | (0.050) | (0.052) |
| Observations | 1,855 | 2,873 | 3,307 | 3,527 | 3,620 |
| R Squared | 0.044 | 0.035 | 0.029 | 0.013 | 0.020 |
| *Panel B: First Stage Relationship between Privatization and Kibbutz Wealth (log thousands)* | | | | | |
|  | -0.117*** | -0.101*** | -0.123*** | -0.121*** | -0.113*** |
|  | (0.034) | (0.033) | (0.034) | (0.031) | (0.032) |
| Observations | 1,245 | 1,954 | 2,291 | 2,520 | 2,713 |
| R Squared | 0.142 | 0.113 | 0.128 | 0.141 | 0.166 |
| *Panel C: Reduced Form Relationship between Kibbutz Wealth (log  thousands) and Fertility* | | | | | |
|  | 0.033 | 0.065** | 0.072*** | 0.047** | 0.017 |
|  | (0.026) | (0.025) | (0.027) | (0.021) | (0.026) |
| Observations | 1,245 | 1,954 | 2,291 | 2,520 | 2,713 |
| R Squared | 0.034 | 0.032 | 0.021 | 0.015 | 0.017 |
| *Panel D: 2SLS Models of the Impact of Privatization on Fertility using Kibbutz Wealth as an IV* | | | | | |
|  | -0.278 | -0.648** | -0.587** | -0.389** | -0.148 |
|  | (0.229) | (0.319) | (0.227) | (0.189) | (0.227) |
| Observations | 1,245 | 1,954 | 2,291 | 2,520 | 2,713 |

*Source*: See Table 1.

*Notes*: See Table 1 for definitions of variables. Age is classified by the age in 1995. Each cell in the table represents a coefficient from a separate regression. All regressions include controls (not shown) for a cubic in age, college degree, Artzi, Central, kibbutz population in 1995, and immigrant status. Sample is restricted to ever-married women. Standard errors are heteroskedastic-consistent and clustered at the kibbutz level.

**Table 3**

Instrumental Variable Models by Education and Kibbutz Size

| | Ages 25-29 | Ages 30-34 | Ages 35-39 | Ages 40-44 | Ages 45-49 |
|---|---|---|---|---|---|
| *Panel A: 2SLS Results by Education* | | | | | |
| A.1. Kibbutz Members without Degree | | | | | |
| | -0.021 | -0.808** | -0.500** | -0.542** | -0.068 |
| | (0.367) | (0.353) | (0.238) | (0.241) | (0.256) |
| Observations | 703 | 1,192 | 1,513 | 1,831 | 2,178 |
| A.2. Kibbutz Members with Degree | | | | | |
| | -0.494 | -0.346 | -0.774** | -0.016 | -0.479 |
| | (0.299) | (0.426) | (0.336) | (0.231) | (0.386) |
| Observations | 542 | 762 | 778 | 689 | 535 |
| *Panel B: 2SLS Results by Kibbutz Size* | | | | | |
| B.1. Kibbutz Members at Small Kibbutzim | | | | | |
| | 0.685 | 0.162 | -0.488 | 0.014 | -0.071 |
| | (0.591) | (0.525) | (0.377) | (0.358) | (0.465) |
| Observations | 639 | 1,087 | 1,235 | 1,251 | 1,216 |
| B.2. Kibbutz Members at Large Kibbutzim | | | | | |
| | -0.590** | -0.772** | -0.556** | -0.470** | -0.13 |
| | (0.252) | (0.300) | (0.237) | (0.198) | (0.236) |
| Observations | 606 | 867 | 1,056 | 1,269 | 1,497 |

*Source* : Israel Central Bureau of Statistics (1995, 2008)

*Notes* : Each cell represents the coefficient from a separate regression. The regressions are estimated in the manner specified in Table 2. The models in Panel A are estimated separately among kibbutz members with and without a degree, and those in Panel B are estimated separately among kibbutz members at kibbutzim below and above the median kibbutz size. Sample is restricted to ever-married women. Standard errors are heteroskedastic-consistent and clustered at the kibbutz level.

**Table 4**

Privatization and Mother's Age at First Birth

| | Ages 25-29 | Ages 30-34 | Ages 35-39 | Ages 40-44 | Ages 45-49 |
|---|---|---|---|---|---|
| *Panel A: OLS Models of the Impact of Privatization on Age at First Birth* | | | | | |
| | 0.042 | 0.107 | 0.203 | 0.338** | 0.159 |
| | (0.177) | (0.156) | (0.142) | (0.171) | (0.166) |
| Observations | 1,596 | 2,800 | 3,267 | 3,471 | 3,556 |
| R Squared | 0.069 | 0.017 | 0.013 | 0.007 | 0.015 |
| *Panel B: First Stage Relationship between Privatization and Kibbutz Wealth (log thousands)* | | | | | |
| | -0.117*** | -0.101*** | -0.123*** | -0.121*** | -0.113*** |
| | (0.034) | (0.033) | (0.034) | (0.031) | (0.032) |
| Observations | 1,245 | 1,954 | 2,291 | 2,520 | 2,713 |
| R Squared | 0.142 | 0.113 | 0.128 | 0.141 | 0.166 |
| *Panel C: Reduced Form Relationship between Kibbutz Wealth (log thousands) and Age at First Birth* | | | | | |
| | .191* | 0.033 | -0.087 | -0.028 | -0.006 |
| | (0.113) | (0.085) | (0.082) | (0.079) | (0.091) |
| Observations | 1,069 | 1,902 | 2,263 | 2,482 | 2,667 |
| R Squared | 0.086 | 0.022 | 0.020 | 0.006 | 0.015 |
| *Panel D: 2SLS Models of the Impact of Privatization on Age at First Birth using Kibbutz Wealth as an IV* | | | | | |
| | -1.720 | -0.326 | 0.707 | 0.236 | 0.044 |
| | (1.159) | (0.851) | (0.641) | (0.657) | (0.800) |
| Observations | 1,069 | 1,902 | 2,263 | 2,482 | 2,667 |
| R Squared | 0.015 | 0.016 | 0.015 | 0.008 | 0.015 |

*Source* : See Table 1.

*Notes* : See Table 1 for definitions of variables. Age is classified by the age in 1995. Each cell in the table represents a coefficient from a separate regression. All regressions include controls (not shown) for a cubic in age, college degree, Artzi, Central, kibbutz population in 1995, and immigrant status. Sample is restricted to ever-married women. Standard errors are heteroskedastic-consistent and clustered at the kibbutz level.

**Table 5**

Placebo Test using Elderly Kibbutz Members

| | Ages 50-54 | Ages 55-59 | Ages 60-64 | Ages 65-69 | Ages 70-74 |
|---|---|---|---|---|---|
| *Panel A: OLS Models of the Impact of Privatization on Fertility* | | | | | |
| | -0.087 | -0.100 | -0.038 | -0.139 | -0.067 |
| | (0.058) | (0.078) | (0.085) | (0.093) | (0.097) |
| Observations | 2,530 | 1,727 | 1,427 | 1,287 | 1,064 |
| R Squared | 0.025 | 0.038 | 0.053 | 0.031 | 0.025 |
| *Panel B: First Stage Relationship between Privatization and Kibbutz Wealth (log thousands)* | | | | | |
| | -0.098*** | -0.104*** | -0.153*** | 0.172*** | -0.115*** |
| | (0.035) | (0.035) | (0.030) | (0.032) | (0.037) |
| Observations | 1,927 | 1,357 | 1,108 | 991 | 778 |
| R Squared | 0.131 | 0.118 | 0.182 | 0.257 | 0.136 |
| *Panel C: Reduced Form Relationship between Kibbutz Wealth (log thousands) and Fertility* | | | | | |
| | 0.006 | 0.020 | 0.043 | 0.035 | -0.034 |
| | (0.032) | (0.039) | (0.046) | (0.048) | (0.042) |
| Observations | 1,927 | 1,357 | 1,108 | 991 | 778 |
| R Squared | 0.035 | 0.055 | 0.055 | 0.036 | 0.032 |
| *Panel D: 2SLS Models of the Impact of Privatization on Fertility using Kibbutz Wealth as an IV* | | | | | |
| | -0.085 | -0.199 | -0.263 | -0.197 | 0.254 |
| | (0.410) | (0.375) | (0.310) | (0.264) | (0.373) |
| Observations | 1,927 | 1,357 | 1,108 | 991 | 778 |

*Source* : See Table 1.

Notes: See Table 1 for definitions of variables. Age is classified by the age in 1995. Each cell in the table represents a coefficient from a separate regression. All regressions include controls (not shown) for a cubic in age, college degree, Artzi, Central, kibbutz population in 1995, and immigrant status. Sample is restricted to ever-married women. Standard errors are heteroskedastic-consistent and clustered at the kibbutz level.

**Table 6**

Differences in Differences and Fixed Effects Estimates of
Privatization's Impact on Fertility

|  | OLS | Kibbutz Fixed Effects |
|---|---|---|
|  | (1) | (2) |
| Young Woman in 1995 and Living at a Kibbutz that Privatizes | -0.077** (0.034) | -0.104*** (0.035) |
| Young Woman in 1995 (1=woman age 25-40) | -0.107 (0.072) | -0.082 (0.072) |
| Living at a Kibbutz that Privatizes (1= kibbutz privatizes) | -0.108*** (0.025) | N/A |
| Observations | 16,770 | 16,770 |
| R Squared | 0.1481 | 0.1438 |

*Source* : Israel Central Bureau of Statistics (1995, 2008)

*Notes* : Controls (not shown) in column (1)  include a cubic in age, degree, Artzi, Central, kibbutz population in 1995, and immigrant status. The first row reports the coefficients on a variable which represents the interaction term of being a young woman living on a kibbutz in 1995 and living on a kibbutz that (eventually) privatizes. The second and third rows report the coefficients on the main effect of (2) being a young woman (ages 25-40) and (3) living on a kibbutz that privatizes. Sample includes ever married women ages 25-40 (younger cohorts) and ever married women ages 50-74 (older cohorts). In column (2), fixed effects for 259 kibbutzim are included. Standard errors are heteroskedastic-consistent and clustered at the kibbutz level.

**Table 7**

Predicting Exit from the Kibbutz

| | Sharing Kibbutzim | | | Private Kibbutzim | | |
|---|---|---|---|---|---|---|
| | All | Men | Women | All | Men | Women |
| Children | -0.088*** | -0.082*** | -0.089*** | -0.043*** | -0.036*** | -0.050*** |
| | (0.012) | (0.018) | (0.013) | (0.009) | (0.013) | (0.009) |
| Log Salary (2008) | 0.065*** | 0.089*** | 0.047*** | 0.049*** | 0.058*** | 0.036*** |
| | (0.007) | (0.013) | (0.009) | (0.005) | (0.008) | (0.007) |
| Observations | 2,717 | 1,121 | 1,596 | 6,821 | 2,978 | 3,843 |
| R Squared | 0.203 | 0.251 | 0.19 | 0.134 | 0.173 | 0.132 |

*Source* : Israel Central Bureau of Statistics (1995, 2008)

*Notes* : The sample is composed of ever-married individuals ages 25-40 observed in a kibbutz in 1995. The outcome in all regressions is a dummy for having left the kibbutz by 2008. Salary is taken from 2008. A kibbutz is classified as private if it privatized at any point prior to 2005. All models include kibbutz fixed effects and controls (not shown) include a cubic in age, degree, and immigrant status. Standard errors are heteroskedastic-consistent and clustered at the kibbutz level.

**Table 8**

Sample Statistics among Stayers and Leavers

| | Sharing Kibbutzim | | | Private Kibbutzim | | |
|---|---|---|---|---|---|---|
| | Stayed | Left | Difference | Stayed | Left | Difference |
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| Children | 3.10 | 2.69 | 0.42*** | 3.01 | 2.81 | 0.21*** |
| Log Salary[1] | 4.18 | 4.62 | -0.44*** | 4.41 | 4.69 | -0.28*** |
| Kibbutz Wealth[2] | 9.48 | 9.14 | 0.34*** | 8.77 | 8.62 | 0.16*** |
| Degree (1=yes) | 0.32 | 0.43 | -0.11*** | 0.29 | 0.46 | -0.16*** |
| Years of Education[3] | 13.65 | 14.26 | -0.61*** | 13.57 | 14.24 | -0.67*** |
| Age | 34.19 | 32.65 | 1.54*** | 34.30 | 32.97 | 1.34*** |
| Male | 0.44 | 0.48 | -0.04** | 0.43 | 0.47 | -0.04*** |
| Observations | 4,066 | 1,232 | | 7,034 | 2,734 | |

*Source* : Israel Central Bureau of Statistics (1995, 2008), Kibbutz Research Center of Haifa (1995-2005)

*Notes* : A kibbutz is classifed as private if its privatizes prior to 2005. Sample is composed of individuals ages 25-40 in the 1995 census. [1]Kibbutz wealth is measured in thousands of shekels and available for 2001. [2]Personal salary information is only available in 2008. Age, marital status, and status as being a new immigrant are taken from the 1995 census. Degree refers to having a bachelor's degree (or more). [3]Years of education is available in 1995 and only for 20% of the sample. Children is taken from the 2008 census. Central area includes the area near Tel Aviv, population centers south of Tel Aviv ("Shfela"), and Jerusalem. Our sample consists of secular kibbutzim, which includes those in either the Artzi or Takam movements.

**Table 9**

Predicting Exit from Israel

| | All Cohorts | Born 1930-1939 | Born 1940-1949 | Born 1950-1959 | Born 1960-1969 |
|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** |
| Children | -0.336*** | -0.105** | -0.228*** | -0.227*** | -0.483*** |
| | (0.02) | (0.04) | (0.05) | (0.03) | (0.04) |
| Years of Education | 0.110*** | 0.023* | 0.014 | 0.052*** | 0.261*** |
| | (0.01) | (0.01) | (0.02) | (0.01) | (0.03) |
| Observations | 139,858 | 9,744 | 19,219 | 54,693 | 52,730 |
| R Squared | 0.006 | 0.001 | 0.002 | 0.002 | 0.006 |

*Source* : Israel Central Bureau of Statistics (1995)

*Notes* : The sample is composed of all ever-married Jews born in Israel who are observed in the 1995 census sample and have a valid reported years of education (long form survey). The dependent variable is a dummy for having emigrated from Israel. The coefficients are inflated by a factor of 100.

**Figure 1**

Comparison of Fertility Patterns among Israeli Jews and Kibbutz Members



Israeli Jews                                          Kibbutz Members
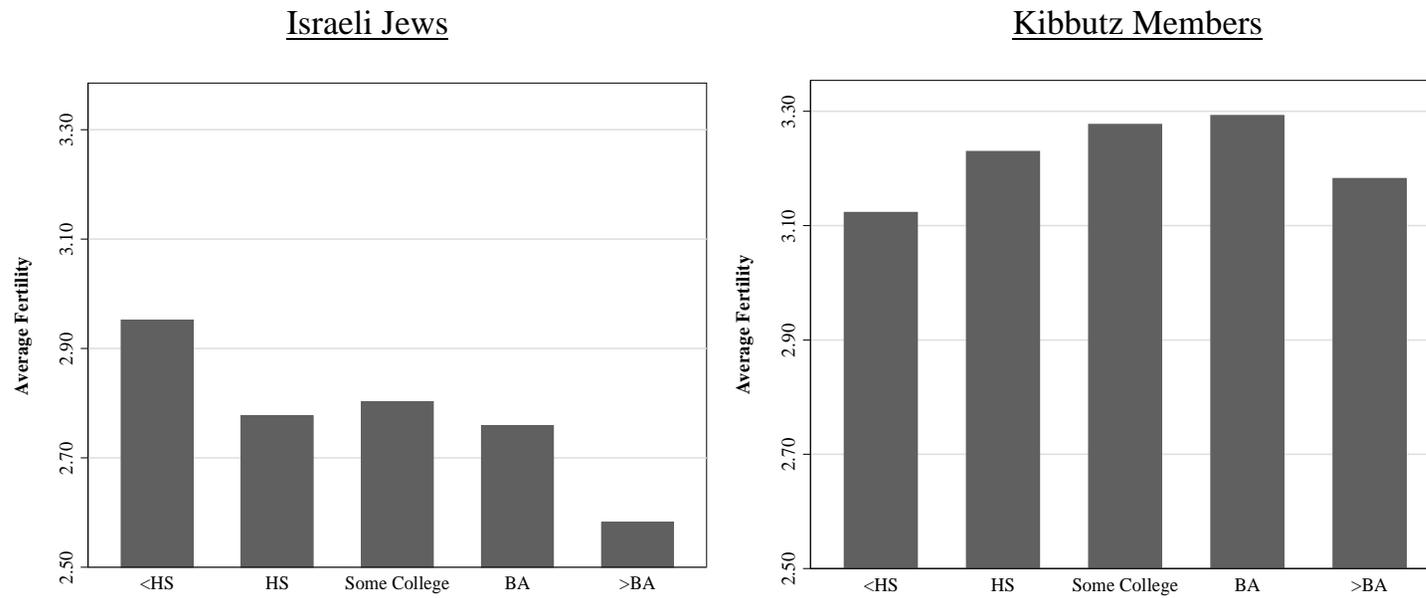
*Source* : Israel Central Bureau of Statistics (1995, 2008)

*Notes* : Sample is composed of Jewish women born in Israel between 1930 and 1945. Fertility information is taken from the 1995 census.

**Figure 2**

Completed Fertility by Kibbutz Wealth among Young and Old Women Living on the Kibbutz

*Panel A: Younger Women (ages 25-40)*    *Panel B: Older Women (ages 50-75)*
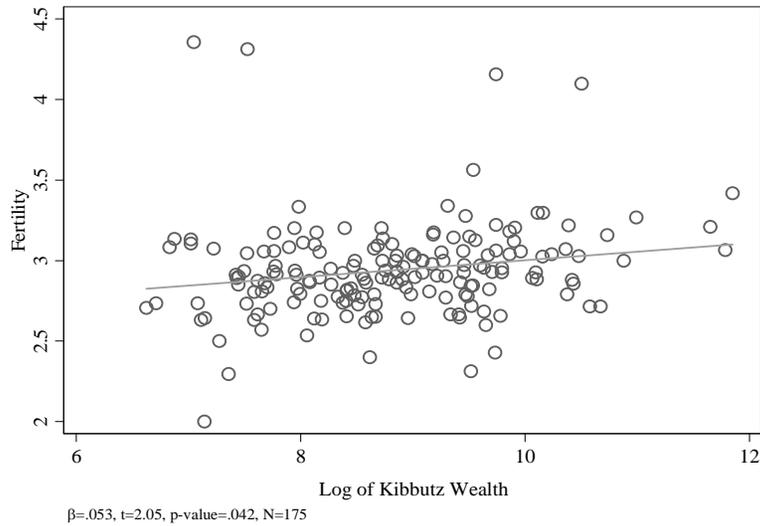


β=.053, t=2.05, p-value=.042, N=175          β=.025, t=.69, p-value=.491, N=173
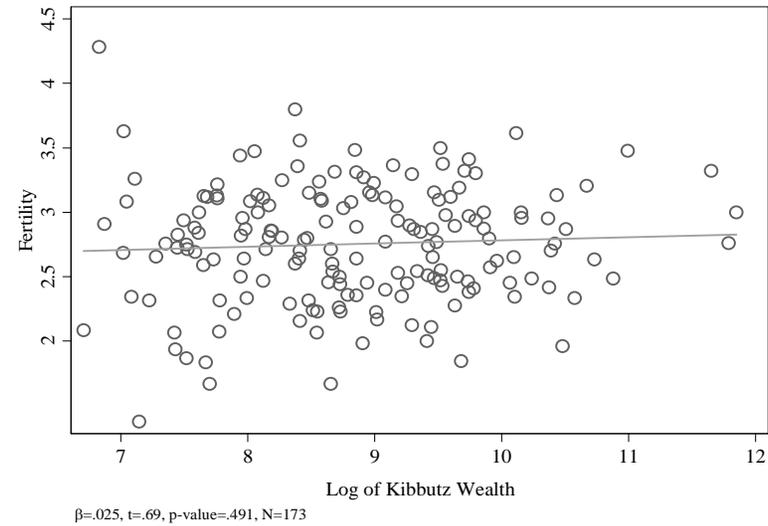
*Source* : Israel Central Bureau of Statistics (1995, 2008)

*Notes* : The figure plots the relationship between fertility and kibbutz wealth among young women (ages 25-40) and old women (ages 50-75) in 1995, when the kibbutz faced financial collapse.

**Figure 3**

Hypothesized Relationship between Individual Wages, Desired Fertility, and Exit from the Kibbutz
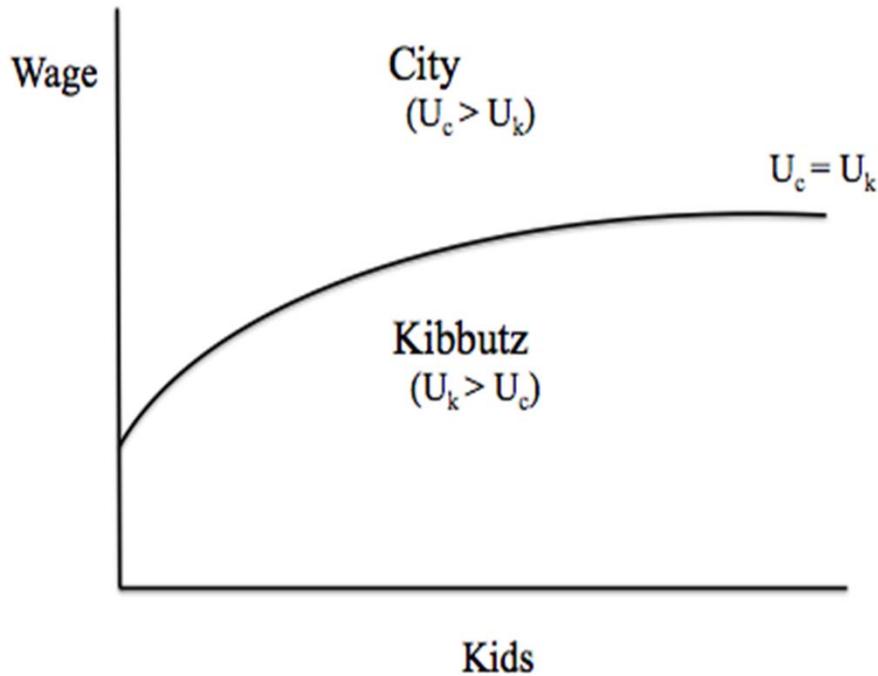


*Note:* The figure above represents a hypothetical relationship between an individual's potential wage outside of the kibbutz, desired fertility, and exit from the kibbutz. The region above the line is the locus of points where an individual would choose to exit the kibbutz.

**Figure 4**

Comparison of Exit Rates in Full Sharing and Privatized Kibbutzim by Income and Children
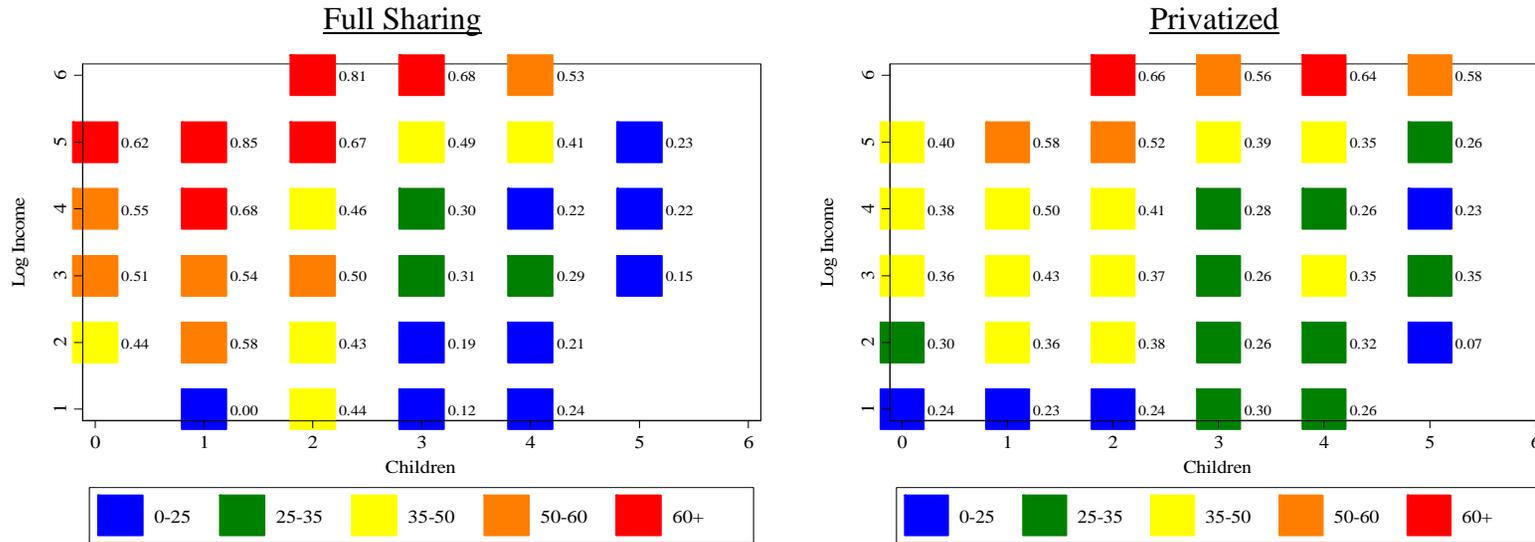


_Source_ : Israel Central Bureau of Statistics (1995, 2008), Kibbutz Research Center of Haifa

_Notes_ : Sample is composed of all kibbutz members ages 25-40 in the 1995 Israeli Census. Log income is observed for each individual in 2008. The color of each cell corresponds to the proportion of individuals who chose to leave the kibbutz between 1995 and 2008. The cells reported are those with at least 10 observations.

**Figure 5**

Exit Rates from Israel by Education and Children
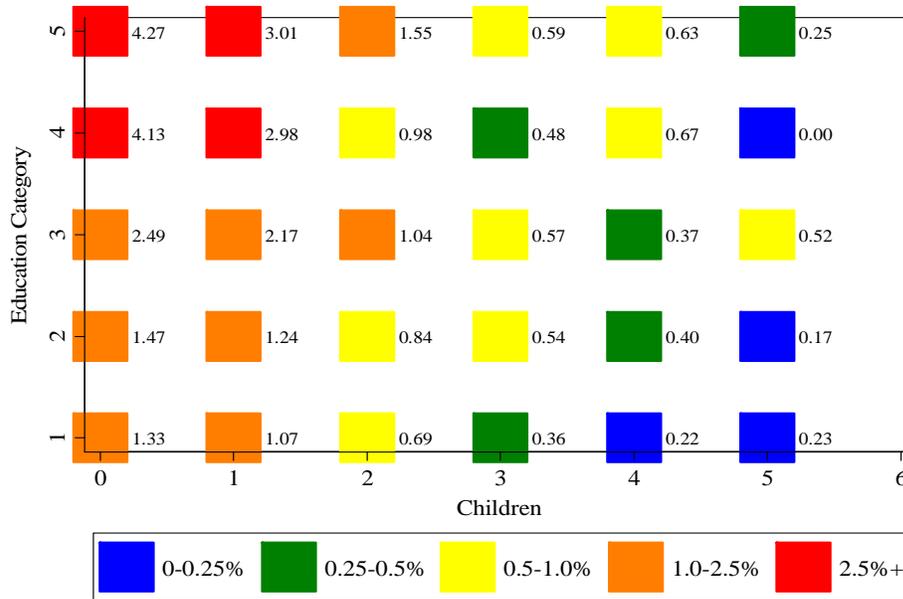


*Notes* : Sample is composed of all ever-married Jews born in Israel between 1930 and 1970. Fertility and education are observed in 1995. The education categories are less than high school, high school graduate, some college, college, and masters degree+.

**Figure A1**

Share of Kibbutzim that Privatized
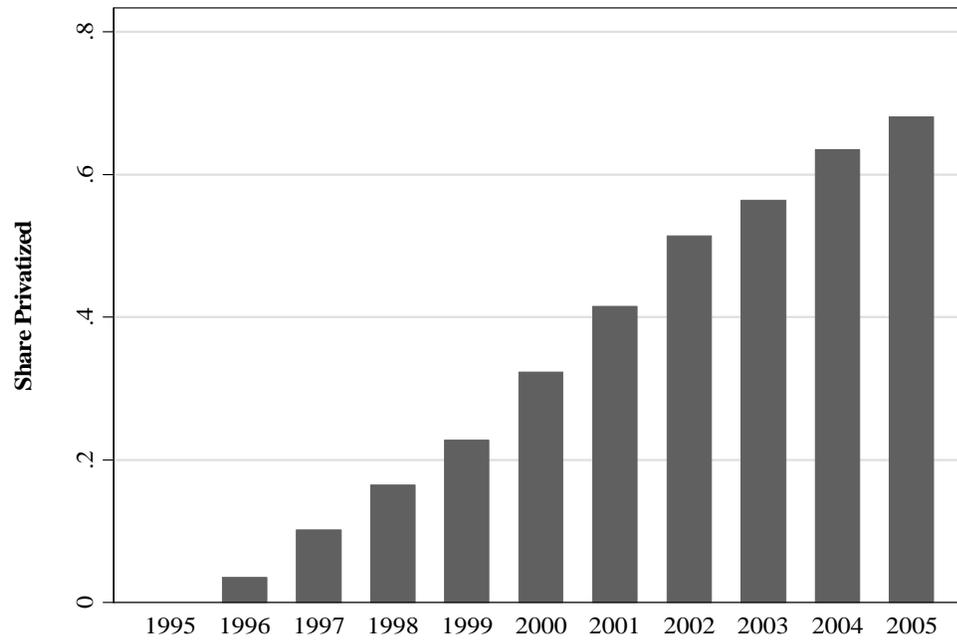


*Source* : Kibbutz Research Center of Haifa (1995-2005)

**Figure A2**

Histogram of Vote Share in Favor of Privatization
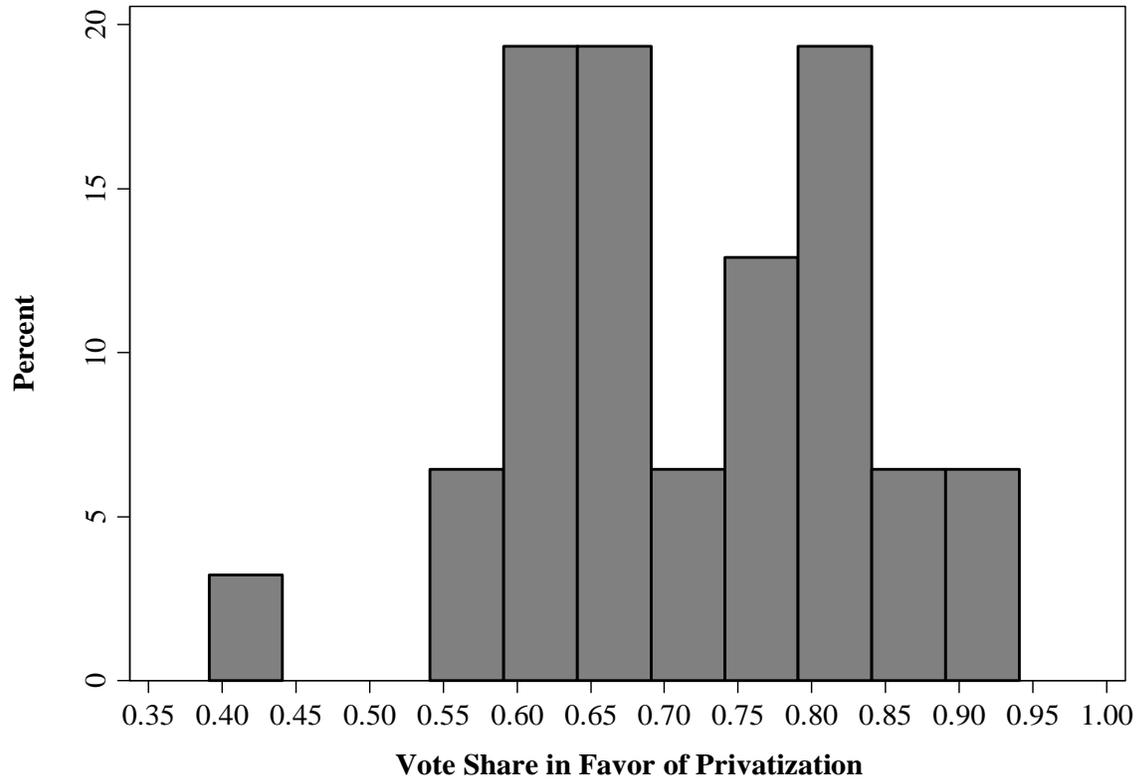


*Source* : Author survey of kibbutzim (1997-2011)

*Notes* : Vote shares include both rounds in which the decision passed as well as previous rounds. The figure is based on a sub-sample of 31 votes for 18 kibbutzim of our sample. In order to pass a decision to privatize, a majority of 2/3 is required.