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Raising the Financial Costs of Children and Fertility Responses: Evidence from the Kibbutz

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Raising the Financial Costs of Children and Fertility Responses: Evidence from the 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 the privatization of kibbutzim on fertility behavior among members. We find that fertility declined by 6-15 percent following the shift to privatization. In light of the massive change in financial costs associated with childbearing due to privatization, our results suggest that financial considerations may be a more modest factor in fertility decisions than generally regarded.

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1 Introduction

To what extent do economic considerations affect fertility decisions? Following Becker's (1960) seminal theoretical 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.

To conduct a reliable econometric study, one would require the observation of a large population who experienced an exogenous shock to the cost of raising children, and their subsequent fertility decisions. To a large extent, this is precisely what occurred in many collective communities (kibbutzim) in Israel during the 1990s and 2000, as a result of a wave of "privatization" where kibbutzim began to require members to bear the costs of children privately. 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, insulating parents from virtually any (financial) marginal cost of having an additional child. Beginning in 1996, however, kibbutzim began to change their economic organization by paying differential wages and charging their members the full price for services that had previously been provided at no cost to the member. Privatization transferred the costs of food, day care, clothing and housing from the collective to the private individual. Between 1996 and 2005, 166 of the 237 kibbutzim were privatized, providing an ideal opportunity to examine how changes in the cost of childbearing affect fertility.[2]

[1] See Laroque and Salanie (2008) 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.

[2] Other scholars have exploited the shared costs of fertility at kibbutzim. For example, Ben Porath (1972) found that in the kibbutzim where there is no private budget constraint and where

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 2008); (Manski and Mayshar 2003); (Cohen et al. 2011).[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 of 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 exploiting the introduction or increase in a means-tested incentive of 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 may not be generalizable to the overall population.

This study, which examines the change in fertility among the membership of Israeli kibbutzim, is superior to 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

many of the child-raising activities are centralized, the wife's education level has no effect on fertility. He found that the wife's education level has a strong negative association with fertility in women not living in kibbutzim.

[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 (2008) 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) wrote, "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. (2011) 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, at best, negligible.

financial costs to having an additional child. As such, our natural experiment represents a large shift in the financial incentives of 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 social status to the overall population. While kibbutz members tend to be somewhat more secular than the Israeli population as a whole, they still 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. Insofar as parents of childbearing age are only a modest fraction of the kibbutz population, it is unlikely that the timing of the switch to privatization was highly correlated with changing fertility tastes. We examine whether the decision to privatize can be treated as exogenous in greater depth in our empirical results, including an analysis of kibbutz privatization votes, which indicate that many of these votes were close. This is consistent with an interpretation that the timing of privatization was not highly correlated with changing fertility tastes. Lastly, since privatization occurred within a single decade, it is unlikely that differential trends in fertility or other coincident factors that were changing during this period could be confounding the effect of privatization.

Using both pooled OLS and OLS models with kibbutz fixed effects, we estimate that relative to the collective cost sharing arrangement, kibbutz privatization was associated with a 6 to 15 percent decline in fertility. Our empirical analysis indicates that parents adjusted their fertility in anticipation of privatization, as we find the most significant decline in fertility in the year prior to privatization – possibly owing to the intense discussions within the kibbutz regarding the potential policy change, and risk aversion among potential parents with respect to the additional costs of having an additional child. Our results are also robust to different sample selection criteria, such as only comparing kibbutzim with a high ex-ante chance of privatizing, and different econometric specifications of our main models. We interpret our findings as evidence that financial considerations have only a modest impact on fertility, as the kibbutz privatization implied

a near full increase in the marginal cost of a child, and decreased demand by less than a sixth. These results suggest that non-financial factors, such as time or fertility tastes, are more important factors in predicting fertility than the financial costs facing parents. We note however that in the absence of rich microdata on kibbutz membership before and after privatization, our results must be interpreted with caution.

The rest of the paper is organized as follows. Section 2 provides background information on the kibbutz movement in Israel and the privatization process that the movement underwent. Section 3 describes the data set and its limitations, and Section 4 presents our pooled OLS results and fixed effect regression results. Section 5 describes the robustness checks conducted and Section 6 concludes.

2 The Kibbutz - Background

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 settlements, called "kibbutzim" ("kibbutz" in the singular), on land purchased with donations from Jews living abroad, and based them on the principle of perfect equality. Under the slogan, "each contributing according to one's ability and receiving according to one's needs," the kibbutz forbade the possession of private property. 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.[5] The kibbutz, in turn, 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 kibbutz children lived together from a very early age, first in a nursery and then in group houses. The kibbutz granted vacations, a trip abroad, and the right to use a kibbutz-owned car for short trips when available. Kibbutz members even voted

[5] In the early kibbutzim, marriage was forbidden as it was perceived to be unnecessary and a form of possession. The resultant rows and disquiet convinced the members that they would be better served by allowing marriage.

on who would be permitted to study at university, and what academic disciplines they could pursue.

The first kibbutz was founded in 1910, and by the 1940s many kibbutzim had been established throughout the country. At their height, kibbutzim 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 moderating their attitudes towards private living and the 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 to members according to their 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. Vouchers for clothing continued to be issued by family size.

The kibbutz movement experienced a severe decline in their political power in the wake of the Labor Party's defeat in 1977, which had historically directed state resources 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. As a consequence, these changes caused a reduction in their economic status relative to the rest of the country, and lowered their relative standing in the country from a situation where kibbutz members had enjoyed higher-than-average standard of living, to a situation where their members were disadvantaged.

This process led to a growing demand within the movement for reforms towards market-based incentives, and a decline in the size of kibbutzim, as members chose to leave the collective and join the overall society. In the mid-1990s, as a response, the kibbutz movement caved in to pressure from many member kibbutzim and began to allow kibbutzim to privatize. Each kibbutz was authorized to hold a vote wherein the membership would choose whether to keep the ex-

isting 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 also potentially could 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 appropriated by the collective. Privatization also requires each member to pay for food, clothing and housing. Hence, whereas before privatization there was no 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 process of privatization, which began in 1996, was rapid. While in 1995, all of the kibbutzim were fully sharing, by 2005, 70% of the kibbutzim were privatized (see Figure 1). 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 of childbearing. However, there is also sufficient variation in the timing of privatization that we can estimate models with kibbutz fixed effects, where we account for unobserved heterogeneity across kibbutzim and instead exploit the timing of privatization. We examine this in greater depth in the next section.

3 Data and Descriptive Statistics

Our data set is composed of 237 secular kibbutzim which were observed during the window of privatization from 1995 to 2005. This sample represents over 90% of all kibbutzim, and nearly 95% of all secular kibbutzim.[6] The Institute for Kibbutz Research in Haifa (Israel) collected information on the economic organization status of each kibbutz. In each year, each kibbutz was classified as fully-sharing, partly-sharing or safety net only (privatized). Since most of the kibbutzim that changed their organization went from fully-sharing to safety net

[6]We choose to leave out the religious kibbutzim for two reasons. First, the general fertility rate in religious kibbutzim is, on average, twice as large as that in secular kibbutzim. Second, when we run a probit regression to predict the probability to privatize, conditioned on kibbutz characteristics in the pre-privatization year, 1995, we observe that religious kibbutzim are less likely to privatize than secular kibbutzim.

only, ("skipping" the partly-sharing status) we pooled the partly-sharing and safety net only categories, and refer to them henceforth as privatized. We define a dummy variable for privatization that is 0 if the kibbutz is currently in the fully-sharing system and 1 if the kibbutz is currently privatized. We also define a dummy variable for ever privatized, which takes the value of 0 if the kibbutz had not privatized by 2005, and 1 if the kibbutz privatized between 1995 and 2005. Our data set also contains information on the kibbutz's year of establishment and its geographic location, identified by the first digit of its postal zip code.[7] For a limited subset of kibbutzim, we have data on the vote share for privatization in each year in which a vote was held. Finally, our data contain information about the average years of schooling for adult male and female members of the kibbutz in 1995.

Data on the number of births and number of women in their fertility window (aged 15-49) were compiled from administrative records collected by the Israeli Central Bureau of Statistics. It should be noted that while the data includes the entire population of kibbutzim, we only observed births among individuals living on the kibbutz, and not births among all kibbutz members. Similarly, our measure for the number of women aged 15 to 49 represents the number of women in that age group who currently live on the kibbutz, and not all kibbutz members. A disparity exists between the sample of kibbutz residents and kibbutz members for two reasons. First, kibbutz members may be on leave from the kibbutz, and currently live elsewhere. Second, many kibbutzim rent apartments in the kibbutz for residents who wish to live on the kibbutz but are not members. These residents, in turn, do not share their resources with kibbutz members and are unaffected by the kibbutz's economic organization. However, in general, the vast majority of kibbutz members live on the kibbutz, and people renting apartments on the kibbutz are a small fraction of individuals living on the kibbutz. Without detailed information on the scale and selection of residents who are not members, we cannot tell, a priori, how our estimates may be biased because of this issue.

However, in Figure 2 we examine this issue indirectly using the data in our pos-

[7] Sixty percent of the kibbutzim are located in the north of Israel identified by a zip code that begins with 1, 2 or 3. There are no kibbutzim in zip codes that start with 5.

session. The figure reports the distribution of women age (15-49) by whether the kibbutz eventually privatized, in both 1995 and 2005. The figure indicates that privatized kibbutzim experienced a decline in the population of fertile women, relative to those that did not privatize. This decline may be due to the increased costs to having children on kibbutzim, or the fact that kibbutz privatization was correlated with declining kibbutz income which made the kibbutz a less attractive living option.[8]We examine the distribution of our key outcome variable, number of births on the kibbutzim, in Figure 3. This unprocessed data suggests that in contrast to fertility growth at kibbutzim that never privatized, privatized kibbutzim had markedly weaker growth in fertility, partly due to lower fertility rates and partly due to declines in the population of fertile women at privatized kibbutzim.[9] We interpret this as evidence that fertility declined in the privatized kibbutzim relative to those that did not privatize, and the effect was attributed both to sorting in which more fertile women chose to live on non-privatized kibbutzim, and also to lower fertility rates among parents at privatized kibbutzim. The role of each factor is assessed in greater depth in the next section of the paper.

4 Empirical Specification

In an ideal situation, the econometrician would randomly assign the economic organization type (fully-sharing versus privatized) across kibbutzim and compare fertility between the two groups. Unfortunately, this is infeasible, and a key challenge to our study is to assess whether the privatization outcome's timing can be treated as exogenous to factors that would also affect fertility, such as measures of financial wellbeing or desired family size.

Table 1 presents statistics in 1995, which is before the first kibbutz privatized. In columns (1)-(3) respectively, we present all the kibbutzim, the kibbutzim which

[8]Another possibility is that the decline in young couples was correlated with the kibbutz decision to privatize. Our data is too limited to address this issue, however it is worth noting that young couples generally represent a small fraction of the votes, and presumably would have only a modest impact on privatization timing.

[9]We also examined the distribution of births per woman, and performed our empirical analysis with this alternative measure. These results are available from the authors upon request.

remained in the fully-sharing arrangement, and those that eventually privatized. While in many ways the two groups of kibbutzim were broadly similar before privatization, kibbutzim that privatized were different in several ways. We observe modest differences in education among residents, with those that privatize having slightly less-educated membership than those that never privatize. Also, the probability of becoming privatized by 2005 is higher among kibbutzim in the center of the country and lower among kibbutzim associated with the leftist Kibbutz Artzi movement.

We also observe differences in fertility rates among kibbutzim that would eventually privatize relative to those that remained fully-sharing. As shown in Table 1, we see that kibbutzim which eventually privatized had somewhat lower fertility in 1995, prior to privatization. This suggests the need to estimate models with kibbutz fixed effects to account for time-invariant differences in fertility tastes across the kibbutzim. However, the table does indicate an increasing disparity in fertility between kibbutzim that did or did not privatize, consistent with our hypothesis that privatization affected fertility. Between 1995 and 2005, the number of births and number of women in a kibbutz diverges sharply, implying that privatization dampened fertility among members, or encouraged families which wanted many children to leave the kibbutz. We further examine the comparability of kibbutzim that privatized versus those that did not in the next section.

We are also able to observe for a subset of kibbutzim the exact vote share in favor of privatization[10], which may help us assess whether a kibbutz's privatization timing can be treated as quasi-random. If many kibbutzim converted due to relatively close votes on this matter, the privatization outcome can be thought to have a random component, implying that privatization timing was only weakly correlated with the fertility tastes of the membership. Ideally, our data would provide vote shares for each kibbutz and we could exploit a regression discontinuity design, where we could include a flexible polynomial in vote share in our specifications to directly account for a correlation between fertility tastes and vote share. In lieu of such data, we present evidence in Figure 4 that among the kib-

[10]This data was 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 this data available to us.

butzim which recorded their vote shares, many had votes near the demarcation of the two-thirds majority required for privatization. The vote shares available are suggestive that, to some extent, privatization timing was quasi-random.

Finally, the gradual nature of the kibbutz privatization decision represents an empirical challenge for our study. Discussions among members evaluating the merits and demerits of privatization typically spanned the year prior to a privatization vote. In our data, we simply observe the timing of privatization, and are unable to observe the timing of when kibbutz members would anticipate the change. Therefore, in our analysis we will examine models where we include leads and lags of the privatization outcome, which allow us to flexibly account for the possibility that changes in fertility could precede or lag the actual privatization of the kibbutz.

4.1 Pooled OLS Regressions

We begin our empirical analysis by running pooled OLS regressions, which take the form:

$$b_{it} = \alpha + \beta p_{it} + \gamma f_{it} + \delta' x_{it} + \epsilon_{it} \tag{1}$$

where b_{it} is the number of births in kibbutz i in year t, f_{it} is the number of women in their fertile period in kibbutz i in year t, x_{it} represents other kibbutz characteristics and p_{it} is the privatization dummy. As previously noted, p_{it} equals 0 if the kibbutz is fully sharing in year t, and 1 if it is privatized. However, this is a narrow econometric model and it does not allow for the possibility that the true effect on fertility is experienced the year before or after privatization.

For most kibbutzim, privatization was anticipated between one and two years before it actually occurred. Typically, the possibility of privatization was raised and discussed for several months and then, when a decision was reached, its implementation occurred over the course of the following year. Therefore, we would expect privatization to affect fertility decisions between one and two years before the kibbutz actually changed its cost-sharing regime. However, since there is a delay of roughly a year between when a couple chooses to have a child and the actual birth (conception, pregnancy), the date of birth reflects a decision made

roughly a year prior to the observed birth. As such, privatization should affect births either a year before it actually occurred if couples used the information on the expected rise in the cost of rearing children, or a year later if they react only to the actual change.

In our empirical analysis, we estimate the same specification as in (1) except that we replace p_{it} with its lead of a year and with its lag. We run the following two alternative specifications: the lead specification

$$b_{it} = \alpha + \beta p_{it+1} + \gamma f_{it} + \delta' x_{it} + \epsilon_{it}$$

and the lag specification

$$b_{it} = \alpha + \beta p_{it-1} + \gamma f_{it} + \delta' x_{it} + \epsilon_{it}.$$

The results are reported in columns (1)-(3) of Table 2, where we estimate the impact of the lag privatized, privatized, and lead privatized respectively on fertility in kibbutz i in year t. The models include basic demographic controls such as the number of females aged 15-49 in the kibbutz, years of education, the type of kibbutz movement, and whether the kibbutz is located in the center of the country. Column 1 presents the results of the lag specification. The coefficient -0.363 is statistically significant at the 5% level and suggests that the number of births in privatized kibbutzim is smaller by more than one third of a birth than fully sharing kibbutzim, after accounting for the number of women in their fertility window. Relative to an average number of births in kibbutzim in 1995 of 6.48, this represents a decrease in the number of births of roughly 6 percent. This suggests that kibbutz members were responsive to the privatization process, but the impact was modest. In column 2, we present the impact of privatization in year t on fertility. The estimated effect is somewhat greater than the impact estimated in column 1, -0.454, and the result is now statistically significant at the 1% level. Column 3 presents the results of the lead specification. Interestingly, the coefficient -0.689 is almost double the coefficient from the lag specification. This indicates that the main fertility decline in response to the rising financial cost of children is observed prior to the actual kibbutz privatization vote, suggesting

that the regime change was largely anticipated, and that fertility adjusted prior to privatization.

In columns 4-6, we add to the models geographic controls and year fixed effects. The geographic controls are the first digit of the kibbutz's zip code. The magnitude of our estimates increases with the inclusion of these additional controls. For example, in column 6, we find that privatization in the following year was associated with a -0.946 decline in the number of births in privatized kibbutzim relative to fully sharing kibbutzim – a fertility decline of roughly 15 percent.

There are several potential difficulties in interpreting our findings as the causal impact of financial costs of childbearing on fertility. The decision of some kibbutzim to privatize may be correlated with an omitted variable that also affects kibbutz fertility. For example, if kibbutzim that suffered an adverse economic shock were more likely to privatize, the result could simply reflect the response of kibbutz membership to the worsening economic conditions of the entire kibbutz, rather than the increased private cost of childbearing. Another possibility is that the kibbutzim which privatize are distinct in other unobserved ways that are also correlated with fertility tastes. For example, it may be that kibbutzim whose members have higher human capital were the first to privatize, and that couples with higher human capital tend to have less children. In the next section, we estimate models that exploit the timing of privatization by including kibbutz fixed effects, which will absorb time-invariant features of kibbutzim that may be correlated with privatization and fertility tastes.

4.2 Fixed Effects Regressions

The regressions reported in Table 2 pooled the data for all of the kibbutzim, and do not exploit the panel nature of our data, where we observed each kibbutz for an 11 year period. The advantage of exploiting the panel nature of our data is that we can include kibbutz fixed effects that absorbs any time-invariant unobserved determinants of fertility at the kibbutz level. The drawback, however is that we do not have variables at the kibbutz level that vary over time other than the

number of women aged 15 to 49, and therefore we cannot control for any time-varying effects, except for time itself. Our fixed effects regressions take the form:

$$b_{it} = \alpha_i + \delta_t + \beta p_{it} + \gamma f_{it} + \epsilon_{it}$$

and also estimated with lead (p_{it+1}) and lag (p_{it-1}) specifications as well.

Table 3 reports the results of these regressions, which are similar to those in Table 2 but with kibbutz fixed effects. Column 1 shows the lag regression of the number of births on privatized, controlling for the number of women aged 15 to 49. The coefficient is 0.170, but statistically insignificant, suggesting that the kibbutz fixed effect is absorbing much of the variation in our sample. Column 2 presents a similar result, the coefficient remains close to zero and statistically insignificant. In column 3, the coefficient on lead privatized is -0.269, and is significant at the 10% level. However, in columns 4-6, when we add geographic controls and year fixed effects, our coefficients are larger, and our main result of a fertility decline in anticipation of privatization is once again observed. In particular, we find that even in models with kibbutz fixed effects, with our preferred set of controls, privatization in year $t + 1$ is associated with a decline in kibbutz births of 0.52 births, significant at the 1% level. This suggests that the decline in fertility in response to privatization is empirically robust to the inclusion of kibbutz fixed effects, and represents strong evidence that a decline in fertility occurred in anticipation to the change in the economic organization of the kibbutz. In combination with Table 2, this result reinforces our prior claim that the main impact of privatization is on fertility choices made prior to privatization. This is not entirely surprising, since as noted, the kibbutz decision to vote on privatization generally was announced roughly a year prior to the actual vote. In our conversations with kibbutz members, they informed us that a privatization vote was often the culmination of intense internal discussions and was anticipated by the members to either result in privatization in the year of the vote, or in the near future. Therefore, we interpret these results as suggesting the actual "event" was the proceedings to initiate a vote. Unfortunately, we have no data on the decision to initiate a vote, and so our analysis was based on the actual timing of privatization. We consider the robustness of these results to different sample selection

choices, and different econometric specifications, in the next section.

5 Robustness

The results reported in the previous sections suggest that kibbutzim which privatized have lower fertility, even prior to the wave of privatizations. In this section we attempt to examine the robustness of the findings to our chosen sample and our econometric specification.

We begin by re-running the fixed effects regressions on a sub-sample of our kibbutzim which are more similar in terms of their ex-ante probability to privatize. Specifically, we run a probit regression to predict the probability of being privatized by 2005 using 1995 data, before the privatization process was initiated. We restrict our sample to kibbutzim with a predicted probability of privatizing of at least 25 percent, removing those kibbutzim that had low ex-ante probability chances of privatizing, leaving us with a sample of kibbutzim that is more similar along observable dimensions. This procedure leaves us with 211 kibbutzim, compared to 237 in the regressions reported in Tables 2 and 3. The results after trimming our sample are reported in Table 4. The results are similar to those presented in Table 2 and 3. Our preferred specification, where we include kibbutz fixed effects and geographic and year controls, produces similar results to those reported in Table 3. Our main finding that fertility declined in anticipation of privatization is reproduced in the restricted sample. The coefficient estimate of the impact of lead privatization with the full set of controls of -0.567, slightly larger than our estimate in the overall sample of -0.520. This suggests that in privatized kibbutzim, fertility declined by 10 percent relative to fully-sharing kibbutzim.[11]

We also re-ran the fixed effect regressions of Table 3 using the general fertility rate as our dependent variable in place of the number of births. We define the general fertility rate (GFR) as the number of births divided by the number of females aged 15 to 49, multiplied by 1000. One advantage of using the general fertility rate is

[11] Although not presented here, we also re-ran all of our regressions using this restricted sample. All of the results were stronger in the sense that the coefficients were larger (in absolute terms) and more precise.

that it narrows our focus to changes in fertility only among women remaining on the kibbutz, and excluding fertility declines associated with selective exodus of fertile women from the kibbutz. As shown in Table 5, the results using the GFR are qualitatively similar to the results Table 3. We again find that the main effect of privatization on fertility is found in the year prior to privatization. In columns 3 and 6, we report that lead privatization is associated with a -3.23 and -3.72 decline in the GFR respectively, with the results statistically significant at the 5% and 10% level respectively. Since the average general fertility rate in kibbutzim in 1995 was 63.01, this represents a decrease in the GFR of roughly 6 percent. This suggests that our choice of outcome variable does not materially affect our conclusion that privatization affected fertility among kibbutz members. Yet, the more modest estimated effect suggests that a major factor in declining fertility following privatization occurs through the exodus of fertile women from privatized kibbutzim, and so the GFR results are weaker than the results on total number of births.

6 Concluding Remarks

In this paper, we examine the impact of financial incentives on fertility by exploiting the radical transformation that many kibbutz members experienced when their collective living arrangements switched from fully-sharing communes to "privatized" communes. Using the rapid conversion of kibbutzim to the privatized model, we estimate that privatization is associated with a fertility decline of roughly 6-15 percent. This impact is concentrated in an anticipatory effect, where kibbutz fertility declined in advance of the actual privatization of the kibbutz. Our estimates are statistically significant at reasonable levels even in models with kibbutz fixed effects, but we interpret the magnitude of the effect as relatively modest, and smaller than the elasticities generally found in the existing literature. We argue that the kibbutz experiment is a superior case study to examine the impact of financial costs of childbearing on fertility, in light of the massive change in costs of childbearing due to the policy change. We conclude that the fertility changes in the wake of kibbutz privatization suggest that, at least

in this context, fertility decisions were made largely independent of the financial costs of raising children. Our study suggests that costs in foregone adult labor or leisure are more critical factors in fertility decisions, and may explain why financial incentive programs globally have not had massive effects on fertility in countries that have experimented with such policy levels.

Our estimates must be interpreted with caution, however. The decision to change the economic structure of the kibbutz was not completely random, and we cannot fully rule out the possibility that factors affecting fertility tastes and the decision to privatize are correlated. Incomplete information on the current residents of the kibbutz, as well as almost no information on kibbutz members who left the kibbutz due to the policy change, represent important challenges to identification. However, in spite of these limitations, we argue that our study presents evidence of a significant decline in fertility among kibbutzim due to this regime change, and that our findings are robust to alternative specifications and sample selection criteria censoring rules. The decline in fertility following privatization is well-documented in our data, and is compelling evidence that parents responded to the increased private costs of childbearing by having fewer children. However, it is also worth noting that in light of the large increase in the costs to child rearing, where children went from being essentially cost-free to being their parents financial responsibility, the modest fertility decline we find suggests that financial considerations play a limited role in fertility decisions among Israeli kibbutz members. Future work should examine in greater detail the non-financial factors that affect fertility decisions, which may prove more central in parental decisions than purely financial considerations.

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Table 1

Sample Means Among Kibbuztim

Variable	All **(1)**	Never Privatized **(2)**	Ever Privatized **(3)**	Difference **(4)**
Years of Education, Males	12.63 (0.79)	12.77 (0.87)	12.57 (0.74)	0.20 (0.12)
Years of Education, Females	12.82 (0.77)	12.93 (0.74)	12.77 (0.78)	0.16 (0.11)
Central Region (1=yes)	0.23 (0.42)	0.18 (0.39)	0.25 (0.43)	-0.06*** (0.02)
Kibbutz Artzi Movement (1=yes)	0.33 (0.47)	0.41 (0.49)	0.30 (0.46)	0.11*** (0.02)
Number of Females (Aged 15-49), 1995	114.16 (53.20)	124.60 (60.19)	109.60 (49.36)	15.00 (7.68)
Number of Females (Aged 15-49), 2005	109.43 (48.47)	122.17 (54.49)	103.94 (44.72)	18.23** (7.10)
Number of Births, 1995	6.48 (3.44)	7.32 (3.87)	6.11 (3.17)	1.21** (0.49)
Number of Births, 2005	6.83 (4.32)	8.22 (4.87)	6.23 (3.92)	1.98*** (0.63)

* significant at 10%. ** significant at 5%. *** significant at 1%.

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

Notes : N=237. Each observation is a kibbutz. Central area includes the area immediately surrounding Tel Aviv, population centers immediately south of Tel Aviv ("Shfela"), and Jerusalem. Our sample consists of secular kibbutzim, which include those in either the Kibbutz Artzi or Takam movements. The number of females and number of births are taken for the listed year from the Central Bureau of Statistics registry.

Table 2

Relationship Between Privatization and Number of Births on the Kibbutz, Pooled OLS

Variable	Kibbutz privatizes: Last Year	This Year	Next Year	Kibbutz privatizes: Last Year	This Year	Next Year
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Privatized (1=yes)	-0.363**	-0.454***	-0.689***	-0.581***	-0.677***	-0.946***
	(0.148)	(0.139)	(0.134)	(0.178)	(0.168)	(0.160)
Number of Females (Aged 15-49)	0.0515***	0.0513***	0.0507***	0.0506***	0.0504***	0.0497***
	(0.00197)	(0.00196)	(0.00197)	(0.00207)	(0.00206)	(0.00207)
Observations	2,378	2,378	2,378	2,378	2,378	2,378
R^2	0.419	0.420	0.424	0.429	0.430	0.435
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	No	No	No	Yes	Yes	Yes
Year Fixed Effects	No	No	No	Yes	Yes	Yes
Kibbutz Fixed Effects	No	No	No	No	No	No

* significant at 10%. ** significant at 5%. *** significant at 1%.

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

Notes: Each observation is a kibbutz in a particular year. The dependent variable is the number of births in a given year. The independent variable is whether the kibbutz privatized in the previous year (1), the current year (2), or will privatize next year (3). In columns (4)-(6), we include geographic controls and year fixed effects. The geographic controls are the first digit of the kibbutz's zip code. Demographic controls include years of education for men and women, whether the kibbutz belongs to the Artzi movement, and whether it is located in the central area of Israel. The average number of births in all kibbutzim during the years 1995-2005 was 6.29.

Table 3

Relationship Between Privatization and Number of Births on the Kibbutz, Fixed Effects

Variable	Kibbutz privatizes: Last Year	This Year	Next Year	Kibbutz privatizes: Last Year	This Year	Next Year
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Privatized (1=yes)	0.170	0.0641	-0.269*	0.0620	-0.0476	-0.528***
	(0.160)	(0.157)	(0.159)	(0.195)	(0.193)	(0.194)
Number of Females (Aged 15-49)	0.0452***	0.0450***	0.0432***	0.0449***	0.0450***	0.0444***
	(0.00728)	(0.00740)	(0.00751)	(0.00755)	(0.00758)	(0.00761)
Observations	2,378	2,378	2,378	2,378	2,378	2,378
R^2	0.597	0.597	0.598	0.602	0.602	0.604
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	No	No	No	Yes	Yes	Yes
Year Fixed Effects	No	No	No	Yes	Yes	Yes
Kibbutz Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

* significant at 10%. ** significant at 5%. *** significant at 1%.

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

Notes: See Table 2. All models in this table include kibbutz fixed effects.

Table 4

Relationship Between Privatization and Number of Births on the Kibbutz, Restricted Sample

	Kibbutz privatizes:			Kibbutz privatizes:		
Variable	Last Year	This Year	Next Year	Last Year	This Year	Next Year
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Privatized (1=yes)	-0.580***	-0.687***	-0.941***	0.0528	-0.0934	-0.567***
	(0.180)	(0.169)	(0.162)	(0.197)	(0.195)	(0.196)
Number of Females (Aged 15-49)	0.0497***	0.0494***	0.0488***	0.0445***	0.0445***	0.0438***
	(0.00216)	(0.00216)	(0.00217)	(0.00779)	(0.00782)	(0.00785)
Observations	2,269	2,269	2,269	2,269	2,269	2,269
R^2	0.423	0.424	0.429	0.595	0.595	0.597
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Kibbutz Fixed Effects	No	No	No	Yes	Yes	Yes

* significant at 10%. ** significant at 5%. *** significant at 1%.

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

Notes: See Table 2. We restrict the sample to all kibbutzim with a predicted probability of privatizing of at least 25 percent. In columns (4)-(6), we include kibbutz fixed effects.

Table 5

Relationship Between Privatization and General Fertility Rate on the Kibbutz, Fixed Effects

	Kibbutz privatizes:			Kibbutz privatizes:		
Variable	Last Year	This Year	Next Year	Last Year	This Year	Next Year
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Privatized (1=yes)	0.0522	-0.625	-3.277**	0.391	0.0172	-3.724*
	(1.564)	(1.481)	(1.496)	(2.002)	(1.942)	(1.933)
Observations	2,378	2,378	2,378	2,378	2,378	2,378
R^2	0.391	0.391	0.392	0.399	0.399	0.400
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	No	No	No	Yes	Yes	Yes
Year Fixed Effects	No	No	No	Yes	Yes	Yes
Kibbutz Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

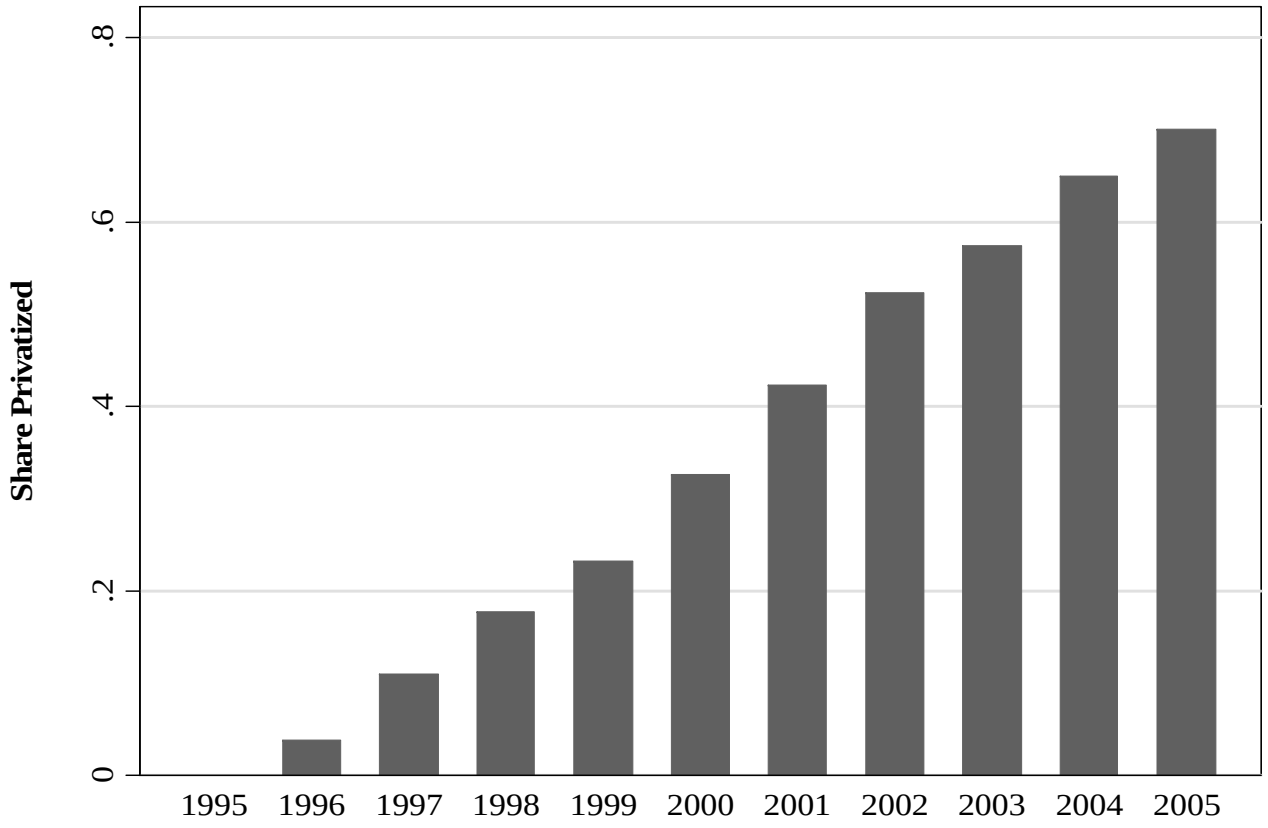
* significant at 10%. ** significant at 5%. *** significant at 1%.

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

Notes : See Table 3. The dependent variable is the general fertility rate, which is the number of births divided by the number of females, multiplied by 1000 for each kibbutz in every year. Because of the structure of the dependent variable, there is no need to control for number of females, and that variable was excluded from this model.

Figure 1

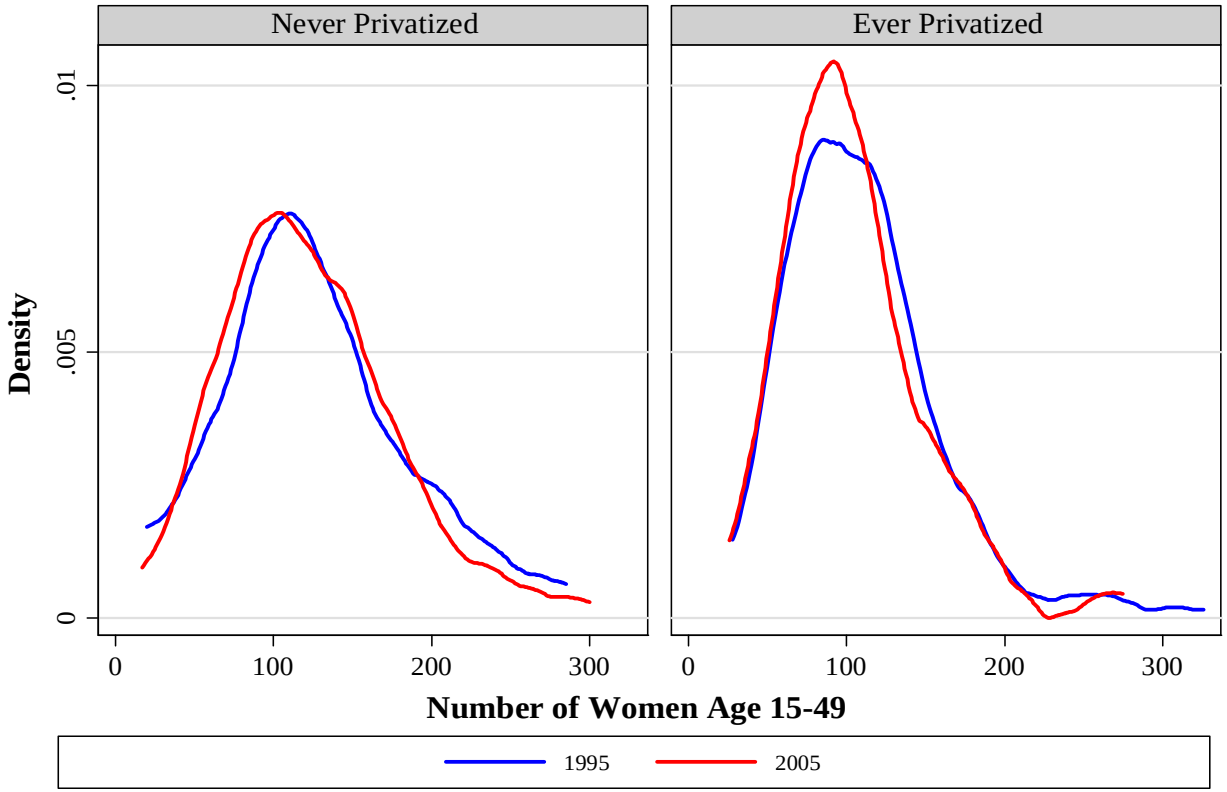
Share of Kibbutzim that Privatized



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

Figure 2

The Distribution of Number of Females aged 15-49, in 1995 and 2005: Never Privatized and Ever Privatized Kibbutzim

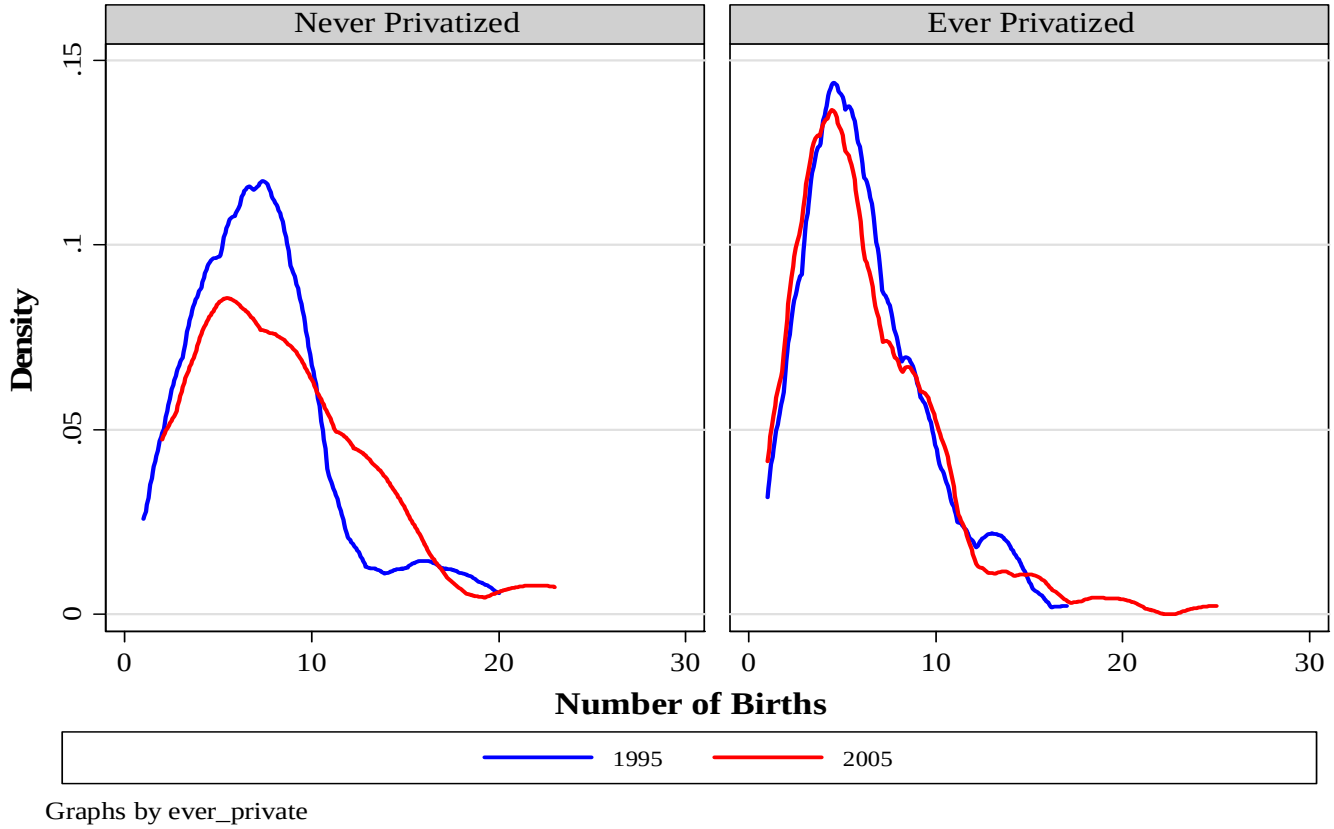


Source : Kibbutz Research Center of Haifa (1995-2005)

Notes: The figure represents a plot of a kernel density function using STATA (version 11) with the Epanechnikov kernel.

Figure 3

The Distribution of Number of Births in 1995 and 2005: Never Privatized and Ever Privatized Kibbutzim

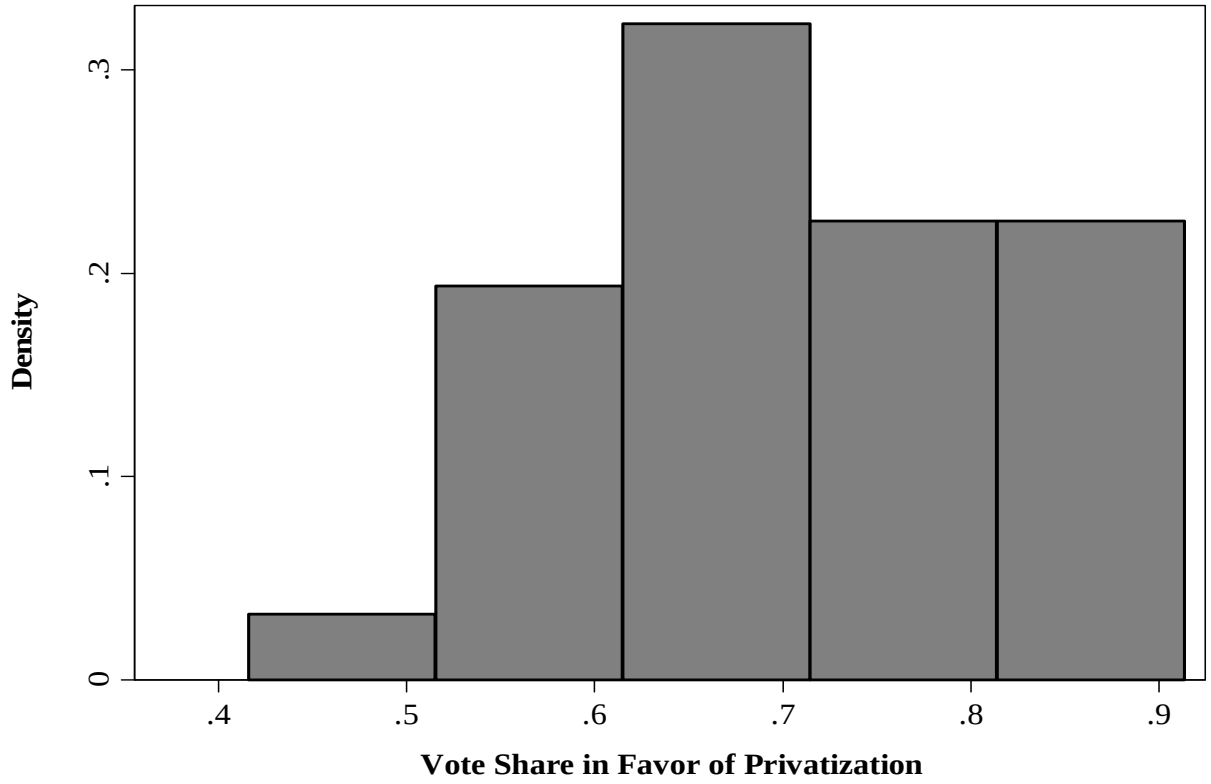


Source : Kibbutz Research Center of Haifa (1995-2005)

Notes: The figure represents a plot of a kernel density function using STATA (version 11) with the Epanechnikov kernel.

Figure 4

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.

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