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***Can Targeted Child Benefits Affect Fertility?  
Evidence from a Natural Experiment***

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# Can Targeted Child Benefits Affect Fertility? Evidence from a Natural Experiment

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## **Abstract**

This paper contributes to the literature on whether targeted cash child benefits can affect fertility and, specifically, induce families to have more than two children. We exploit the introduction of a monthly non-means tested cash child benefit paid only to families with at least four children. We apply a quasi experimental methodology since the reform is expected to have increased births of *fourth* child relative to births of *third* child or higher than four. We find robust evidence that the reform increased significantly the treated family's probability to have a (fourth) child by about 5% and had no effect on births greater than four. In the post reform period, the control group's probability to have a (third) child was not significantly different than before the reform. In particular, the finding that the probability of birth among parities greater than four was not affected by the reform supports that what we are estimating is a response of the targeted family to the introduction of the child benefit and not a change in the fertility preferences of families with many children. Other changes (besides the reform) had a negative effect on the probability to have a child that was reversed only for the birth of *fourth* child among treated families due to the economic incentives created by the reform.

JEL Classification: D12, J13, J18, H31, J11

Keywords: fertility, child benefits, financial incentives, unbalanced sex ratios, female labour force participation.

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# 1 Introduction

The fertility rate has been declining and is below the replacement rate in many developed countries.<sup>1</sup> An important question in public finance is whether financial incentives can reverse this undesirable decline in fertility that also threatens the sustainability of the pension system. Economic theory predicts that public policy which boosts household income and changes the cost of children can increase the number of desired children through a positive income and own price substitution effect (Becker, 1960). The empirical evidence on the causal effect of public policy on fertility relates to different types of government benefits to families with children in various countries including the introduction of a one time payment after the birth of a child, expansion to access in public child care and changes in parental leave benefits, child benefits, child deductions and tax credits. The findings of this research is largely inconclusive.

In this paper, we contribute to this international literature by using as working laboratory the experience of Cyprus, an EU member state. We exploit a policy change that introduced for the first time in 1988 a targeted non-means tested monthly cash child benefit paid only to families with at least four children (known as multi-member families). The benefit amount given to each multi-member family varied with the number of its dependent children and did not vary with the level of its income. The aim of the government was to complement the income of the multi-member family rather than to induce families to have more children. However, this income transfer changed the price of child and could have had an effect on the probability to have a child (Gauthier, 1996; 2013). Most of the existing research assessed the impact of cash benefits that were more widely available to all families with children. Child benefit programs exist in all EU and most OECD countries mainly as a means to alleviate poverty and make the tax and benefit system more equitable.<sup>2</sup> In some countries the benefit is contingent on household income

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<sup>1</sup>For example, live births per woman in the EU were 1.59 in 2017 and ranging from 1.26 in Malta to 1.90 in France.

<sup>2</sup>Consequently, the emphasis has been more to examine the impact of child benefits on household expenditure and other socioeconomic indicators. Recent studies include, among others,

while in other countries it is a lump sum. By exploiting the particular setup of this specific reform, we aim to contribute to the experimental evidence on the effectiveness of targeted financial incentives in inducing households to have more than two children. The evidence can be useful in the design of policy since an increase in the fertility rate requires that there is an increase in births not only on the extensive but also on the intensive margin.

Initial research relied mostly on the time variation of benefits to children to identify their effect, which may not be sufficient to identify the fertility effects of policy due to unobservable characteristics. For example, different cohorts of mothers may have different unobservable characteristics that are important for their fertility decisions. The findings of this research suggested that this type of transfer has a limited effect on births. Studies include Whittington, Alm and Peters (1990), Blanchet and Ekert-Jaffe (1994), Crump, Goda and Mumford (2011), Ermisch (1988), Zhang, Quan and Meerbergen (1994), Gauthier and Hatzius (1997), Kearney (2004), Whittington (1992), Baughman and Dickert-Colin (2003), Moffitt (1998) and Hoynes (1997).

More recently, there has been other research that again found mixed evidence. For example, Cohen, Dehejia and Romanov (2013) exploited changes in the Israeli child subsidy for third and higher order births and estimated significant fertility responses to the child subsidy. Laroque and Salanie (2014) estimated a structural model and simulated the fertility effects of benefit increases in France. They found a more substantial effect of financial incentives for first and third birth. The impact of child deductions and tax credits on fertility was also examined and the evidence suggested that they encourage fertility. Studies include Azmat and Gonzalez (2010) for Spain and Brewer, Ratcliff and Smith (2009) for couples in the UK. Nevertheless, Francesconi and Van der Klaauw (2007) found a reduction in the probability of lone mothers to have another child after the enactment of the Working Families' Tax Credit in the UK. Similar evidence was found by Riphahn and Wijnck (2017) who exploited the 1996 reform of the German child benefit

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Jones, Milligan and Stabile (2018), Milligan and Stabile (2011), Blow, Walker and Zhu (2012) and Lyssiotou (2017; 2018).

program to identify the effect of means-tested child benefits on fertility. They found that the effects of the reform on low income couples were not statistically significant. But they found some support for positive fertility effects for higher as opposed to lower income couples deciding on a second birth. There has also been research that exploited other types of benefits to families with children that may affect fertility, which mostly relate to Germany. For example, Cygan-Rehm (2016) examined the causal effect of an unanticipated change in the German parental leave benefit scheme in 2007 on higher-order births. The reform involved a move from a means tested to an earnings-related benefit. The evidence suggested that the reform changed the probability of another birth within 36 months but it did not affect the timing of births within the 36-months window. The effects of this reform on fertility were also investigated by Stichnoth (2020) using a structural model, which predicted that a return to the pre-2007 system would reduce first births in 2012 to a large extent while the reaction for second or higher-order births would be much smaller.

Bauernschuster, Hener and Rainer (2016) provided empirical evidence on the relevance of public child care for fertility by exploiting a major German reform from the mid-2000s, which led to a large-scale expansion of public child care for children under the age of three. They found that this reform had significant positive effects on fertility that were more pronounced at the intensive than at the extensive margin. Studies that exploited pro-natalist policies that aim to boost fertility directly (i.e. Canada, France) estimated that fertility responds positively to this type of policy. For example, Milligan (2005) exploited the introduction of an explicit pro-natalist cash benefit given on the birth of a child in the Canadian province in Quebec in the 1990's and found that it raised fertility by 12% for first birth and 25% for third and subsequent births. Gonzalez (2013) studied the introduction of a new, sizeable, unconditional one time payment after a birth in 2007 in Spain and found that the number of births increased by 6%.

In this study, we present evidence that complements the existing international findings. The setup of this specific natural experiment enables us to investigate whether targeted financial incentives can increase births of third and higher order. It also allows us to apply a quasi-experimental methodology as it is expected to

have increased births of fourth child relative to births of third child or higher than four. Our choice of control and treatment groups is supported by the common trends assumption that is required to hold to obtain valid difference-in-difference estimates and other estimation considerations. The amount of the child benefit was non-means tested that enables us to more clearly define the treatment and control groups and avoid endogeneity issues, which may arise with income dependent child benefits as income is likely to be endogenous to fertility. Previous studies that exploited means tested benefits used educational attainment as a proxy to define the treatment and control groups. We also address potential threats to our identification strategy. This specific reform was exogenous that enables us to avoid policy endogeneity issues (Besley and Case, 2000).

Our estimates of interest are robust to sample selection, alternative specifications and estimations and other econometric considerations. We find that the reform increased significantly the treated family's probability to have a (fourth) child by about 5% and had no effect on births greater than four. In the post reform period, the control group's probability to have a (third) child was not significantly different than before the reform. In particular, the finding that the probability of birth among parities greater than four was not affected by the reform supports that what we are estimating is a response of the targeted family to the introduction of child benefits and not a change in the fertility preferences of families with many children. We also find that other changes (besides the reform) affected negatively the probability of birth in the post reform period. Other factors include the declining sex ratios of marriageable age individuals and increase in the mean age of a woman. Nevertheless, the economic incentives created by the reform reversed the adverse impact of other factors only on the treated family's probability to have a fourth child. Our investigation of the fertility effects of this specific reform tends to suggest that targeted child benefits can affect the decision of families to have more than two children.

In section 2, we describe the child benefit reform. In Section 3 we describe the data and identification strategy. We provide an overview of other factors that may have affected fertility outcomes in the post reform period that we take into consideration in the empirical estimation. We also acknowledge potential threats

to the identification strategy and explain how they are addressed. In Section 4, we present the empirical model and empirical findings based on alternative specifications. We also conduct further estimations to show the robustness of our findings. Finally, section 5 concludes.

## 2 The Reform

Cyprus has an individual income tax system that taxes the income of the two spouses separately. Starting in 1985, aid to all families with children was given in the form of a child tax allowance that was split between the parents depending on their individual income. In addition, a targeted cash non-means tested monthly child benefit paid only to multi-member families (defined as the family with at least four dependent children) was introduced for the first time on 1st of January, 1988 by the Law on the Provision of Child Benefits. The Law was passed on the 24th of December, 1987 and was immediately put into effect. The aim of this cash payment was to complement and reinforce the income of the multi-member family (Annual Report of the Ministry of Labour, Welfare and Social Insurance).<sup>3</sup>

The benefit amount varied with the number of dependent children of the multi-member family. According to the Law, dependent children were considered: (i) the children under 15 years old (ii) unmarried children between 15 and 18 years old (iii) unmarried children between 18 and 25 years old that do their service in the National Army (iv) unmarried sons between the ages of 18 and 25 and unmarried daughters between the ages of 18 and 23 that were continuing their education and (v) unmarried children independent of age that had a handicap. The monthly payment was made by check to the beneficiary parent who was the mother if the parents were living together. The child benefit for each dependent child continued to be given to the multi-member family even after the number of

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<sup>3</sup>The details of the Law can be found on the following website (retrieved, January 2021): [http://www.cylaw.org/nomoi/indexes/1987\\_1\\_314.html](http://www.cylaw.org/nomoi/indexes/1987_1_314.html). The Annual Reports of the Ministry of Labour, Welfare and Social Insurance (1987; 1989) can be found on the following website (retrieved, January 2021): [http://www.mlsi.gov.cy/mlsi/mlsi.nsf/mlsi30\\_gr/mlsi30\\_gr?OpenDocument&Start=1&Count=1000&Expand=4](http://www.mlsi.gov.cy/mlsi/mlsi.nsf/mlsi30_gr/mlsi30_gr?OpenDocument&Start=1&Count=1000&Expand=4)

dependent children decreased below four and until all dependent children were not eligible. The beneficiary parent was the parent who had the care of the children if the parents were not living together and the father if the mother was not alive.

On 1st of January, 1988, when the benefit was first introduced, the monthly amount was very small and amounted to Cyprus £7 (11.96 Euros) per dependent child and the amount of the benefit was given starting from the third child of the multi-member family. There was an amendment to the Law on 2nd April, 1991 and from 1st of July 1991 the monthly payment increased substantially to Cyprus £20 (34.17 Euros) per dependent child of the multi-member family. Also, the amount of the benefit started to be given to all the dependent children of the multi-member family. On 1st of January 1996, the monthly benefit amount increased to Cyprus £24 (41.06 Euros) per eligible child of the multi-member family and remained at this level in 1997. Subsequently, there were other smaller increases in the monthly child benefit amount. By 2002, the monthly amount was raised to Cyprus £31.35 (53.56 Euros) per dependent child of the multi-member family.

Table 1 gives the total annual child benefit payment per child over the period that it was in effect. Concentrating on the period up to 1997, between 1/1/89 - 30/6/1991, the real payment amounted to 143.50 euros annually per child and represented 1.63% of the average household income (2.4% of average household expenditure) of the multi-member family in 1991/92. On 1st July 1991, when it started to be paid to all dependent children of the family, it increased significantly to 403.06 euros annually per child. This change more than doubled the annual payment and represented 9.6% of the average household income (14.2% of the average household expenditure) of the multi-member family in 1990/91. Thereafter, there were smaller increases in the amount of the payment. In 1996/97, it amounted in real terms to 381.90 euro annually per child, which represented about 6% of the average household income (13.67% of the average household expenditure) of the multi-member family in 1996/97. By 1995, there was a 386% increase in the number of children that received the payment. There were no other tax



and benefit reforms over the period 1984-1997 that we study.<sup>4</sup>

### 3 Data and Identification Strategy

Our empirical analysis uses the individual data of the Cyprus Family Expenditure Survey (Household Budget Survey), which is representative of the population and is similar to the FES surveys of other developed countries. The data is collected by the Department of Statistics and Research of the Republic of Cyprus. The survey has a twelve month duration and contains information about demographic characteristics, employment status, the level and sources of income and useful information about the living standards of the native population. The basic unit of data collection and analysis of the Family Expenditure Survey is the household and information is provided on all members of the household such as their relation to the head (i.e. head, spouse, child, other relation, no relation), marital status, working status. The age of each individual at the time of the interview is recorded in years. We use this information to construct the number of children of the household at different ages. The birth probability (had a child) is defined to be equal to one if, at the time of the interview, the household had a child age 0-1 (i.e. the child was born in the last twelve months) and zero otherwise. There is no information on whether a child is a biological child of the head of household. Information on whether a child lives within the household is available only in the FES 1996/97. Similarly, information on whether a male child does his mandatory service in the army is available only in the FES 1996/97 survey.

In order to implement our quasi-experimental methodology to assess the impact of the reform, we need information on the structure of families and other household and individual characteristics before and after the reform. For the period under examination, there is one survey before the child benefit reform and two

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<sup>4</sup>Much later, there was a big tax and benefit reform in 2002. Starting 2003, the non-means tested child benefit to multi-member families and the child tax allowance to all families with children were replaced with a universal child benefit payment given to all families depending on the number of children. Also, low income households received an additional cash child benefit, which varied with the number of children.

surveys after the reform. Specifically, the 1984/85, 1990/91 and 1996/97 surveys that include 3759, 2708 and 2644 households respectively, which represent 2.52%, 1.6% and 1.3% of the household population respectively.<sup>5</sup> We use the 1984/85 survey as the sample before the child benefit reform. As post reform samples, we use the FES 1990/91 and FES 1996/97 surveys. We conduct the estimations using the observations on all families because the reform may have affected family arrangements (Bitler, Gelbach and Hoynes, 2006).<sup>6</sup> We keep the observations of the households with the female (spouse/head) being younger than 46 years old and male (head) being younger than 55 years old. The number of observations in the 1984/85 pre-reform sample and the two post reform samples 1990/91 and 1996/97 is 2262, 3204 and 1484 respectively. The marital status of the head of household remained the same across the three cross sections. Specifically about 91% of the households are couple (married) male headed with female spouse, about 5% are single female headed households and the rest are single male headed households. Couple female headed households are almost non-existent.

Our identification strategy exploits the differential impact that this policy change is expected to have had on the fertility behavior of families with different number of children at ages 2-17. We take the lower bound to be age 2 since we define the birth probability (had a child) to be equal to one if, at the time of the interview, there is a child of age 0-1 in the household (i.e. the child was born in the last twelve months) and *zero* otherwise. The upper age bound of children is taken to be 17 years old since, both before and after the reform, the children up to this age were not married. Hence, they were eligible for the benefit if they were children of a multi-member family.

Although the reform increased the economic incentive to have a child, families with already three children are expected to have had the highest probability to respond to the reform and have an additional (fourth) child since, by doing so, they would become immediately eligible for the benefit payment that would be

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<sup>5</sup>Published studies have used earlier versions of the Cyprus FES surveys and include Christofides and Pashardes (2002), Lyssiotou (1997, 2008, 2017).

<sup>6</sup>This is not expected to be an issue because social norms at the time of the reform were still very conservative.

given to all four children of the family. Compared to this type of family, the economic incentives for all other families are expected to be smaller. For example, families with two children age 2-17 would not become eligible for the payment if they had a third child. Families with already four or more children age 2-17 were eligible for the benefit payment even if they did not have another child. We take the treatment group to be the families with three children age 2-17. Families with more than three children age 2-17 are not a good choice of control group as they were eligible to receive the payment even without having another child. Instead, we take the control group to be the family with two children age 2-17. This type of family would not become eligible for the payment even if it chose to have a third child. Also, the fertility preferences of the family with already two children (control group) are more likely to be similar to those of families with already three children (the treatment group).

Table 2 reports the descriptive statistics of key variables in the Family Expenditure Survey data by year and type of family that we use to conduct the empirical analysis. The list of control variables includes dummy variables if the family has one, two, three and more than three children age 2-17 to allow for the possibility that different sized families have different fertility behavior. It also includes dummy variables for couple household, working spouse (female/wife), working status of the head and living in rural areas. It also includes the age of the head, age of the spouse and its square and the number of additional adults in the household (besides the head and spouse) including a housekeeper if present in the household.<sup>7</sup> It also includes the household's annual income that excludes child benefits and the spouse's (wife's) labour market earnings to avoid problems arising from the endogeneity of the spouse's (wife's) working status and household fertility. All nominal variables are deflated. Between 1984/85 and 1996/97,

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<sup>7</sup>The estimate of the additional adults also captures the effect of the presence of a domestic worker in the family that cannot be estimated separately since the information is available only in the 1996/97 survey. As mentioned previously, there is no reason to expect that the presence of a domestic worker in the household would affect differently the probability to have a child among native families with three children age 2-17 (treatment group) and native families two children age 2-17 (control group). In fact, based on the 1996/96 survey that has this information, the probability to have a domestic worker in the household is not significantly different among different sized families.

the probability to have an additional child decreased among all types of families except for families with three children age 2-17. For this type of family the birth probability doubled over the sample period; 2.6% in 1984/85 and 4.4% in 1996/97. As a consequence, there was a doubling of multi member families; 3% in 1984/85 and 6% in 1996/97. The mean annual real household income, as we defined it above, increased for all sized families.

Our choice of control group is also supported by the common (parallel) trends assumption that is required to hold for this family to be a valid control group and obtain valid difference-in-difference estimates. This identifying assumption implies that, before the reform, the underlying trends in the fertility behavior of the treatment group are similar to that of the control group. Hence, in the absence of the reform, the fertility behavior of the treatment group would have changed in the same way as that of the control group. We use macro statistics on the total number of births by parity to examine the validity of the common trends hypothesis because there is only one cross section of individual data before the reform. Figure 1 plots the total number of births by parity and supports that the common trends identifying assumption is satisfied as the underlying trends for births of *fourth child* (treatment group) are similar to the trends for births of *third child* (control group) before the reform (1985-1989). The trend across the different parities is overall stable and not significantly different before the reform.<sup>8</sup> Right after the reform, births of first and second child were more or less stable but started to decline after 1992. Births of third child (control group) were stable right after the reform, increased slightly in 1992 and thereafter started to decline as well. In contrast, births of fourth child increased after the reform, achieved a peak in 1992 and thereafter remained stable. Births for parities greater than four were more or less stable throughout the sample period.

### Other Factors

Figure 2 shows that the total number of births decreased significantly in the

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<sup>8</sup>This is supportive evidence that policy endogeneity (Besley and Case, 2000), which may arise when pro-natalist policies are exploited, is not an issue in this study since before the reform the number of births of forth and higher parities were not significantly different than the number of births of third child.

post reform period, in particular after 1992. As indicated in Figure 1 and Table 1A in the Appendix, the same applies for births of parities smaller than four. In contrast, there was a significant and substantial increase in the number of births of fourth child (59%) and parities greater than four (55%) in the post reform period (Table 1A). The downward trend in the total number of births cannot be explained by the reform but may be due to other changes. For example, unbalance sex ratios may affect the probability to have a child by having an impact on demand and supply in the marriage market (Becker, 1981 and Grossbard-Shechtman, 1984). The literature exploited exogenous shocks to sex ratios due to wars and found that male scarcity led to lower marriage and fertility.<sup>9</sup> Studies include, Bitler and Schmidt (2012) and Brainerd (2017). Figures 1A-4A in the Appendix plot the sex ratio indices defined as the number of males over the number of males and females in each of the fertile age groups 20-24, 25-29, 30-34 and 35-39 since 1960, which show the scarcity of men in each of these fertile age groups.<sup>10</sup> Focusing on the period immediately before and after the 1988 reform, we observe a continuous fall in the sex ratio of age groups 20-24 and 25-29 that is strongly correlated with the scarcity of baby boys age 0-4 born about two decades earlier, which is exhibited in Figure 5A in the Appendix. These were difficult and turmoil years for the country.<sup>11</sup> Figure 2 also shows the strong association between the decline in births over the period that we study (i.e. 1985-1997) and the decline in births about two decades before the reform.

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<sup>9</sup>Research concentrated mostly on the impact of unbalanced sex ratios on marriage and other social and economic variables, such as labour force participation, parental sex selection, earnings, disability status and crime, rather than on fertility. Studies include Angrist (2002), Wei and Zhang, (2011) and Edlund et al. (2013).

<sup>10</sup>The data are from the OECD database, which gives information on the size of the population by gender and age group since the late 1950's.

<sup>11</sup>Cyprus gained its independence in 1960 after a four year revolt. In the years that followed, there was political instability, tension, high uncertainty and the war in 1974. Net migration was negative and substantial as a large percentage of the population emigrated to other countries, mostly the UK and Australia. The imbalances exhibited by the sex ratio indices of the cohorts of men and women who were in their marriageable and fertile ages at the time of the 1988 reform can be explained by the fall in the number of births over 1960-1970, emigration of the population to other countries, displacement of the population within their own country, casualties of the war.

In the post reform period, there was also a secular shift in the timing of births through the delaying of marriage and childbirth that could have affected the probability of birth. As indicated in Figure 6A in the Appendix, the mean age of women to have their first child increased by about two years. Consequently, in the post reform period, if families were delaying childbirth longer then they were older when they reached a higher order of children and less likely to have had an additional child because of age. Differently from the child benefit reform, this change is expected to have affected negatively births of all parities. Also, in relation to Figure 2, the increase in the mean age of women to have their first child in the 1990's can explain why the fall in the total number of births in the 1990's is greater than that in the 1960's. In 1991, there was a relaxation of the law restricting the use of foreign workers in order to alleviate shortages of unskilled workers. Thus, workers employed in the household sector increased whereas in 1985 they were non-existent. Existing research has highlighted the potential beneficial effects of immigration on the fertility and female labour supply of natives. In particular, low skilled foreign domestic workers are expected to reduce the cost of household services, have a positive effect on fertility and weaken the work-fertility trade-off (Cortes, 2008; Furtado and Hock, 2010). However, there is no reason to expect that the increase in foreign workers employed in the household sector would affect the fertility behavior of native families with three children age 2-17 differently than the fertility behavior of native families with less or more than three children age 2-17. The descriptive statistics of the individual data that we use to conduct the empirical estimations confirm this expectation. Specifically, they indicate that the probability to have a domestic worker within the household is not significantly different across different sized families.

### **3.1 Other Estimation Considerations**

Next, we acknowledge issues of identification and endogeneity that may potentially affect the validity of our difference-in-difference estimates. We also explain how we address these issues.

A key assumption in using the difference-in-difference approach is to identify

the appropriate control group. We already presented evidence which tends to support that families with already two children are a valid control groups as the underlying trends for births of fourth child (treatment group) are similar to the trends for births of third child (control group) before the reform. Nevertheless, it can be argued that the reform may have incentivised families with two children age 2-17, who desired more children even in the absence of the benefit, to speed up later births in order to maximize the received benefit amount. This type of trends may have a bearing on the choice of control group because they may imply endogenous effects on fertility timing. We address this concern by examining the average spacing between children across parities before and after the reform. The statistics at the bottom of Table 2 indicate that the average spacing between children across parities was not significantly different before and after the reform, with the exception of the average spacing between second to third child that was higher and not lower in the post reform periods.

Another assumption that underlies our identification strategy is that there should be no spillover effects between the treatment and control groups. For example, the reform might have changed the marriage behavior and educational outcomes of female and male youth because their parents could receive the benefit longer if they remained unmarried and in education up to age 23 and 25 respectively (given that their family was multi-membered). Consequently, the reform might have created disincentives for marriage and, simultaneously, extended education among the young generation. In such a case, the treatment status may be endogenous if the young generation postpones the decision of leaving the parental home due to later marriage or extended education or both. This type of behavior may in turn also lower the fertility among the youngest groups of potential parents, i.e. ages 18-25. Endogenous sorting into marriage and education among potential parents is more likely to affect the estimates based on the 1996/97 post reform survey since adolescents in the early 1990's, when the benefit was introduced, were primarily in fertility ages in the late 1990s.

The statistics at the bottom of Table 2 indicate that, on average, the percentage of male children age 18-25 and female children age 18-23 of the head of household were not significantly different across the three surveys. The percent-

age of unmarried male children age 18-25 and female children age 18-23 that were still in education was higher in both post reform surveys (1990/91 and 1996/97) compared to the survey before the reform (1984/85). This pattern may reflect treatment induced compositional changes. However, it may also reflect some general trends due to changing social factors and may not be due to the reform. If this is the case then the estimated effect of the reform on these outcomes should be zero. We investigate this issue further by evaluating whether the reform led to a significant change in the probability of male children age 18-25 and female children age 18-23 of multi-member families to remain unmarried, in education and unmarried and in education, controlling for common time trends in these outcomes for multi-member and non-multi-member families. Table 2A in the Appendix reports the marginal probit estimates for the outcomes of remaining unmarried and in education and in education of male children age 18-25 and female children age 18-23. The results support that there were no significant changes due to the reform. The estimates for remaining unmarried are the same and can be made available. The linear regression estimates for all the outcomes are the same and can also be made available. These results reduce concerns of potentially troublesome compositional changes and lend credibility to our identification strategy.

Our empirical strategy also relies on comparing the fertility behavior of families with different number of children at ages 2-17. Thus, it is important to examine the reform's effect on the number of children at ages 2-17 as it determines the treatment status. In Table 2, the summary statistics suggest that we cannot reject that this covariate is balanced at the 5% significance level. Nevertheless, as a robustness check, we also present the results based on the number of children age 2-15 in the next section. Our findings support the robustness of the estimates of interest. Also, it can be argued that some of the other covariates may be potentially endogenous to the reform. At the 5% significance level, we cannot reject that key covariates like the number of additional adults are balanced. As a further robustness check, we also present the estimation results without conditioning on the vector of control variables in the next section. The results support the robustness of our estimates.



## 4 Empirical Model and Results

### 4.1 Empirical Specification

We estimate the following difference-in-difference model using all three cross section datasets and various nested specifications:

$$\begin{aligned} Had\ a\ child_{it} = & \alpha_i + \sum_j \gamma_j Dkids_{ijt} + \Sigma_k \delta_{ik} \mathbf{z}_{ikt} + \beta_i Y_{it}, + \\ & w_i post91_t + \hat{w}_i post96_t + \\ & \sum_j \theta_j (post91_t * Dkids_{ijt}) + \sum_j \pi_j (post96_t * Dkids_{ij}), \quad (1) \end{aligned}$$

where  $i$  indexes the family. The dummy variable *had a child* takes the value of *one* if the family had a child with age 0-1 at time  $t$  (time of the interview). The variable  $Y_{it}$  is log real household income excluding the wife's labour earnings and child benefits. The dummy variables  $Dkids_{ijt}$  for  $j = 0, 1, \dots, 4$  take the value of *one* if the family has *zero, one, two, three and more than 3 children* age 2-17 respectively at time  $t$ . These variables capture preference heterogeneity in having a child 0-1 among families with different number of children. The *post91* and *post96* dummies take the value of *one* for observations in each of the two post reform periods respectively and zero otherwise.

The  $w_i$  and  $\hat{w}_i$  parameter estimates capture the change in the probability to have a child in the post reform period 1990/91 and 1996/97 respectively that is common across families with different number of children age 2-17. This change may be due to other factors like the mean age of females to have their first child, foreign workers and sex ratio index. In order to assess the effect of changes in the sex ratio index separately from the effect of changes in other factors, we combine the individual data with information on the sex ratio index defined as the number of males over the number of males and females of the same age group as the husband in the family in each sample period, as in Chiappori et al. (2002). Vector  $\mathbf{z}_{ikt}$  includes the number of young children age 2-5, number of children age 6-17, their interaction and a dummy if the family has two children age 2-17 of the

same sex and the sex ratio index.<sup>12</sup>

We assess the impact of the child benefit reform by interacting the  $Dkids_{ijt}$  dummy variables with the  $post91$  and  $post96$  reform dummies. We conduct the estimations by taking the reference family to be the control group family that has two children age 2-17 in order to use the same vector of interaction dummy variables across the various nested specifications. Thus,  $\gamma_2, \theta_2$  and  $\pi_2$  are set equal to zero and the  $post91$  and  $post96$  dummy estimates capture the change in the probability to have a third child in each of the two post reform periods. In the context of equation (1), our causal estimates of interest are  $\theta_3$  and  $\pi_3$  that capture the change in the probability of birth of fourth child after the reform compared to the change in the probability of birth of third child. Our testable hypothesis is that  $\theta_3$  and  $\pi_3$  are positive and statistically significant.

We conduct the estimations using both the probit model and linear probability model. We provide estimates by pooling together the two post reform samples and also using either one of the two post reform samples. We first present the estimates using the families with two and three children age 2-17 as this is the target group of the reform and provide the preferred estimation strategy discussed earlier. We also provide estimates based on the sample of all families with more than one child age 2-17 and the whole sample of all families. Moreover, we conduct all the above estimations using the sample of married families. In addition, for each one of the above estimations, we present the results without conditioning on the vector of control variables as some of the covariates may be potentially endogenous to the reform.

## 4.2 Empirical Results

Table 3 reports the probit parameter estimates based on the samples of all families and married families with two and three children age 2-17 as this is the target group of the reform. The estimates of interest are robust and very similar across

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<sup>12</sup>We also conduct the estimations by excluding the post reform dummies and including the mean age of a woman to have her first child and number of migrants. The effects of these variables on fertility are as expected and the parameters of interest remain the same.

the various specifications. They suggest that the reform did not have a significant impact on the probability of birth of fourth child in 1990/91 when the amount of the payment was very small and paid to the multi-member family starting from the third child onward. However, the reform increased the probability of the treated family to have a fourth child between 5.6-5.9% in 1996/97, when the amount of the benefit almost doubled and was paid for all the children of the multi-member family. The *post91* and *post96* estimates are not statistically significantly different from zero suggesting that the probability of birth of third child was not significantly different in the post reform period than before the reform. An exception are the *post91* and *post96* estimates in specifications (5) and (11), which suggest that the control family had about 2.5% lower probability to have a third child in 1996/97 than before the reform. Nevertheless, even in these two specifications, the estimates indicate that the positive impact of the child benefit reform on the probability of birth of fourth child reversed the adverse effect of other changes in the post reform period and overall the probability of birth of fourth child was higher by about 3.4% compared to the probability of birth of fourth child in the period before the reform.

In Table 3, the even numbered specifications show that the estimates are not sensitive to the whole vector of control variables.<sup>13</sup> Changes in the sex ratio index, which can partly explain the decrease in the probability to have a newborn child in the post reform period, are found to have a statistically insignificant effect. Also, the spouse's (wife's) labour force participation is negatively related with the probability to have a newborn child. The effect of most of the other control variables is insignificant. The corresponding linear regression estimates are reported in Table 3A in the Appendix. The estimates of interest are very similar but slightly smaller than those in Table 3. They suggest that the reform increased the probability of the treated family to have a fourth child by about 4% - 5% in 1996/97.

As a robustness check, we conduct the estimations using the observations on

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<sup>13</sup>The estimates are the same when we exclude only the control variables characterizing the number and ages of the children age 2-17 and household income. These results are not reported but can be made available.

all families and married families with more than one child age 2-17. The results are reported in Table 4 and they are similar to those in Table 3. The estimates indicate that the reform increased the probability of the treated family to have a fourth child by about 5.5% in 1996/97 and had no significant effect on the probability of birth of fourth child in 1990/91. In contrast, compared to before the reform, the probability to have a (third) child or fifth or subsequent child are not statistically significantly different from zero in both post reform periods. In particular, the finding that the birth probability for parities greater than four were not affected by the reform supports that what we are estimating is the response of the targeted family to the reform and not a change in the fertility preferences of families with many children. The rest of the estimates are also very similar to those of Table 3. Table 4 also shows that the estimates are not sensitive to the whole vector of control variables. The corresponding linear regression estimates are reported in Table 4A in the Appendix and are similar to those in Table 3A. They suggest that the reform increased the probability of the treated family to have a fourth child by about 4% - 5% in 1996/97.

In Table 5, as an additional robustness check, we report the estimates based on the sample of all families and married families. The fit of all the estimated specifications improves when we use the sample of all couples. Compared to Table 3, the estimated impact of the reform on the probability of the treated family to have a fourth child in 1996/97 is bigger (8%-9%) and, in some specifications, more statistically significant. Similar to Tables 3-4, the estimates of interest are not sensitive to conditioning on the vector control variables. The corresponding linear regression estimates in Table 5A in the Appendix are very similar to those in Tables 3A indicating that the reform increased the probability of birth of fourth child about 4% - 5% in 1996/97. Regarding the estimates of the other control variables, we find that the birth probability increased at a decreasing rate with the age of the female spouse. It also increased with log real household income. Thus, children are a normal good for the parents. Also, fertility and female labour force participation are negatively related. The effect of changes in the sex ratio on the probability to have a newborn child is stronger suggesting that the falling sex ratio affected mostly the birth probability of first and second child in 1990/91, as

it is also indicated by the trends in Figure 1. Based on specification 9 in Table 5A, a one percentage point decrease in the sex ratio index decreased significantly the birth probability by 2.15 percentage points.

### 4.3 Further Robustness Analysis

In this subsection, we conduct other estimations to examine further the robustness of our estimates of interest.

First, our empirical strategy relies on comparing families with a different number of children at ages 2-17. As we noted earlier, the benefit was granted to the children of the multi-member family under age 15 and this age range was extended to 17 if the children were not married. Because it can be argued that the threshold of age 17 is arbitrary, we examine the sensitivity of the estimates of interest to changes in the upper bound that determines the payments. Tables 6A-8A in the Appendix present the probit estimates when, alternatively, our empirical strategy relies on comparing families with a different number of children at ages 2-15. We find that the estimates are similar to those reported in Tables 3-5. In fact, the estimates of interest indicate that the reform had a bigger impact on the probability of the treated family to have a fourth child in the post reform period 1996/97. Specifically, they range between 7%-8% in Tables 6A-7A and 10% -11% in Table 8A.

Second, in all of the estimations, the birth and work decisions are negatively related. These estimates may be biased due to the simultaneity of the fertility and birth decisions. Previous literature used the wife's education level as a proxy for her participation in the labour market to correct for this endogeneity problem. We cannot use this approach because the FES 1984/85 does not include information on the level of education. We address this potential econometric issue by modelling jointly the birth and work outcomes and estimating a standard bivariate probit and recursive bivariate probit (Green 2018).<sup>14</sup> Table 9A in

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<sup>14</sup>The estimation of a recursive multivariate probit model requires some consideration for identification of the model parameters. Maddala (1983) proposes that at least one of the reduced form exogenous variables is not included in the structural equations as explanatory variables. We

the Appendix reports the bivariate probit estimates of the birth and wife’s work equations. The estimates of the birth equation are similar to those of the single equation estimates. All else equal, the reform did not have a significant impact on the probability of birth among families with less or more than three children age 2-17. In contrast, in the 1996/97 post reform sample, families with three children age 2-17 had about 9% higher probability than families in the control group to give birth to a child. Also, the rest of the parameter estimates are similar to the single birth equation estimates we presented earlier. The estimates of the work participation equation show that benefit recipient mothers with more than three children had a 18% significantly lower probability to work than mothers with less than four children age 2-17 in the 1996/97 post reform sample. This result is in line with the theoretical predictions about the negative income effect that out of work benefits can have on the recipients’ labour supply.<sup>15</sup>

## 5 Conclusions

In light of demographic aging and low fertility rates, it is important to understand how public policies affect fertility. In this paper, we contribute to the existing international experimental evidence on whether targeted child benefit transfers can affect the decision of families to have more than two children.

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impose the exclusion restrictions by first including the variables in the structural equation and omitting them when they were insignificant. The exclusion restrictions are the age of the husband and its interaction with the rural dummy. These exclusions can also be justified theoretically because these two variables can determine the wife’s work participation and indirectly affect the fertility through the wife’s work participation once we condition on the wife’s age and living in a rural area in the fertility equation.

<sup>15</sup>In the bivariate probit model, the correlation coefficient ( $\rho$ ) between the residuals of the birth and work probit equations is negative. The null hypothesis that  $\rho$  is equal to zero is rejected. In the recursive bivariate probit model,  $\rho$  is insignificant. Filipini, Greene, Kumar and Martinez-Cruz (2018) showed that if a BP model is estimated on data arising from a RBP process, the resulting BP correlation parameter is a weighted average of the RBP correlation parameter and the parameter associated to the endogenous binary variable in the RBP. The estimates in Table 8A support this result, which may imply that the RBP correlation parameter does not necessarily reflect the correlation between the binary variables under study (Filipini et al., 2018).

We exploit the introduction of a monthly non-means tested cash child benefit paid only to families with at least four dependent children. Initially, the amount of the transfer was small but, subsequently, it became more substantial and represented about 6% of household income and 13.67% of household expenditure of the recipient family. Our quasi-experimental identification strategy exploits the targeted nature of this transfer and the differential impact it is expected to have had on the financial incentives to families with different size to have another child. Specifically, the reform is expected to have increased births of fourth child relative to births of third child or higher than four.

Our causal findings about the impact of this reform on fertility are robust to sample selection, estimation method and other considerations. They indicate that the reform increased significantly the probability of the treated family to have a (*fourth*) child by about 5% but did not affect the probability of birth of fifth or subsequent child. In the post reform period, the probability of the control family to have a (*third*) child was not significantly different than before the reform. In particular, our finding that parities greater than four were not affected by the reform supports that what we are estimating is a response of the targeted family to the reform and not a change in the fertility preferences of families with many children. As a consequence of the incentives provided by the reform, the negative impact of other factors on fertility in the post reform period (like the increase in the mean age of a woman to have her first child and declining sex ratio of marriageable men and women) was reversed only for the birth of fourth child among treated families. Overall, the evidence tends to suggest that targeted child benefits can induce families to have more than two children.

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**TABLE 1: CHILD BENEFIT PAYMENT TO  
FAMILIES WITH MORE THAN THREE CHILDREN**

Period	Annual Payment per Child			Change	
	Nominal		Real	Nominal	Real
	(Cyprus £)	(Euros €)	(Euros €)	%	%
Until 30/6/1991	84.00	143.52	143.52	-	-
1/7/91 -	240.00	410.06	403.06	185.71	180.84
1996	288.00	492.08	395.66	20.00	-1.84
1997	288.00	492.08	381.90	0.00	0.00
1998	296.64	506.84	384.78	3.00	0.75
1999	307.32	525.09	391.81	3.60	1.83
2000	319.68	546.21	391.77	4.02	-0.01
2001	368.88	630.27	443.31	15.39	13.15
2002	376.20	642.78	439.80	1.98	-0.79

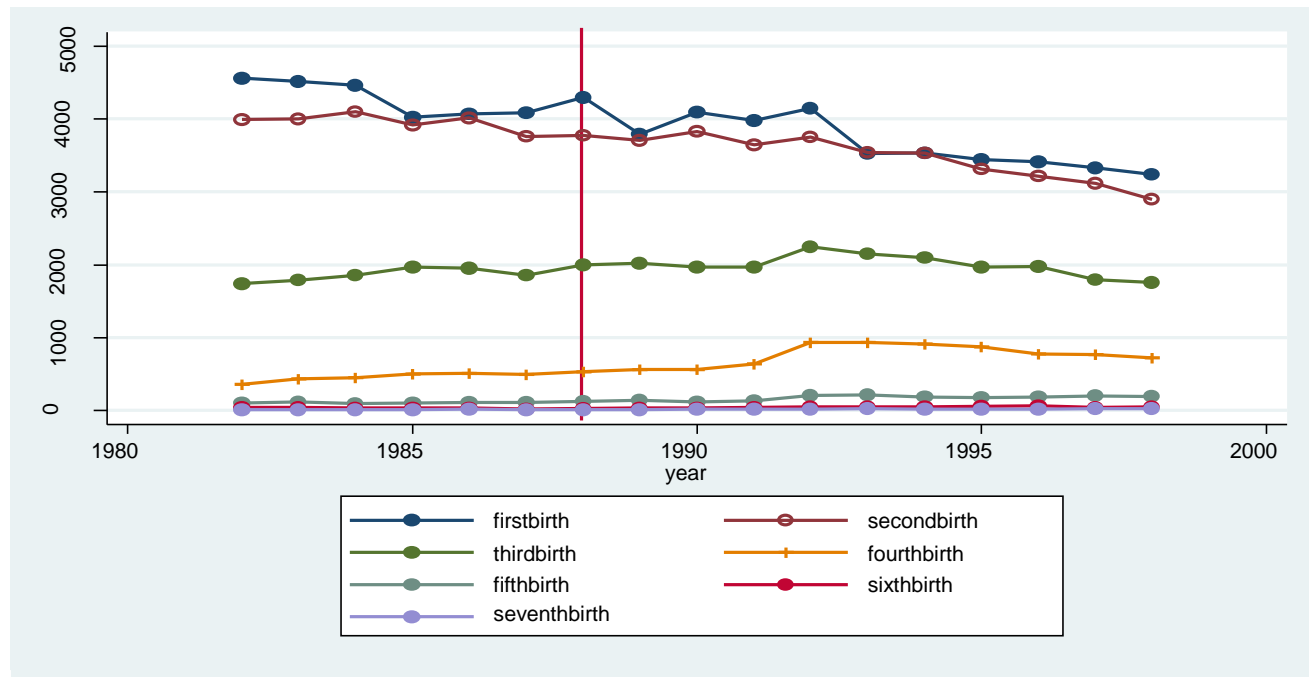
*Note:* The above are the total annual benefit payments for each dependent child of a family with more than three children under the Law on the Provision of Child Benefits introduced in 1988. Until 30/6/1991, the amount was paid starting from the third child onward. Afterwards, it was given to each of the dependent children of the multi-member family. The conversion rate as of 1/1/2008, when the country entered the Eurozone, is €1= Cyprus £0.585274.

TABLE 2: SUMMARY STATISTICS

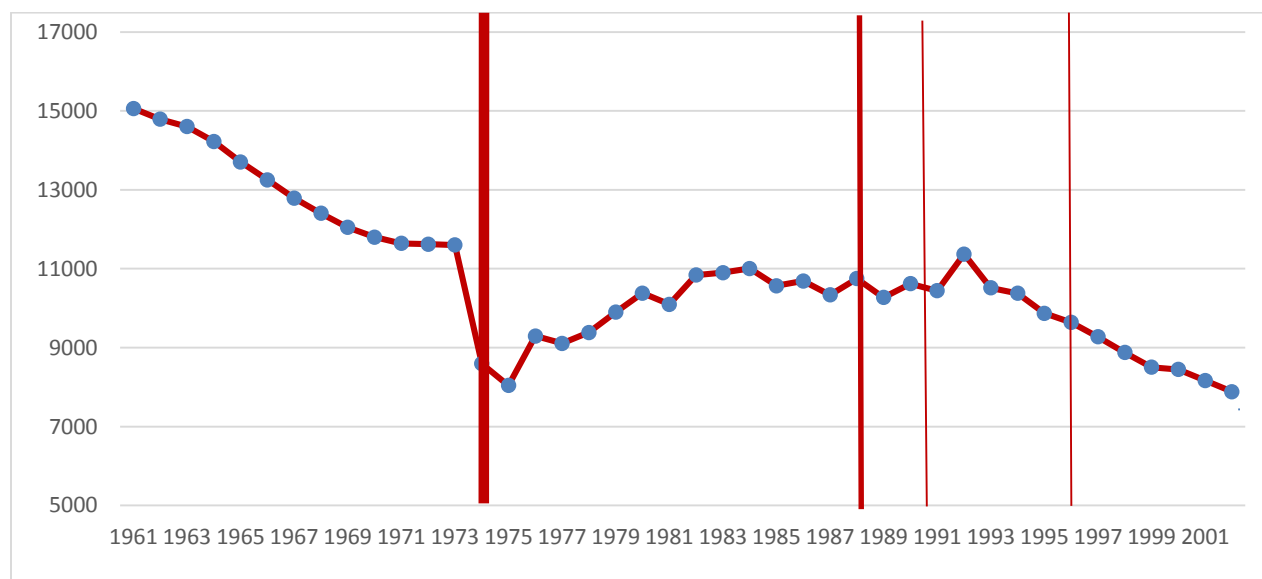
VARIABLES	BEFORE REFORM: SURVEY 1984/85						AFTER REFORM: SURVEY 1990/91						AFTER REFORM: SURVEY 1996/97					
	Total	Number of Children Age 2-17					Total	Number of Children Age 2-17					Total	Number of Children Age 2-17				
		none	one	two	three	>three		none	one	two	three	>three		none	one	two	three	>three
	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd	mean/sd
Birth Probability	0.110 (0.31)	0.123 (0.33)	0.215 (0.41)	0.066 (0.25)	0.026 (0.16)	0.053 (0.22)	0.086 (0.28)	0.083 (0.28)	0.187 (0.39)	0.054 (0.23)	0.027 (0.16)	0.082 (0.28)	0.070 (0.26)	0.090 (0.29)	0.114 (0.32)	0.045 (0.21)	0.044 (0.21)	0.022 (0.15)
Number of Children age 2-17	1.470 (1.14)	0.000 (0.00)	1.000 (0.00)	2.000 (0.00)	3.000 (0.00)	4.342 (0.66)	1.527 (1.15)	0.000 (0.00)	1.000 (0.00)	2.000 (0.00)	3.000 (0.00)	4.327 (0.62)	1.546 (1.22)	0.000 (0.00)	1.000 (0.00)	2.000 (0.00)	3.000 (0.00)	4.198 (0.50)
Number of Children Age 2-5	0.485 (0.69)	0.002 (0.04)	0.527 (0.50)	0.661 (0.80)	0.756 (0.82)	0.921 (0.95)	0.452 (0.67)	0.000 (0.00)	0.460 (0.50)	0.601 (0.75)	0.726 (0.80)	0.918 (0.83)	0.441 (0.68)	0.000 (0.00)	0.414 (0.49)	0.561 (0.74)	0.760 (0.86)	1.011 (0.86)
Number of Children Age 6-17	0.987 (1.08)	0.000 (0.00)	0.475 (0.50)	1.339 (0.80)	2.244 (0.82)	3.421 (1.13)	1.076 (1.08)	0.000 (0.00)	0.543 (0.50)	1.399 (0.75)	2.274 (0.80)	3.408 (1.01)	1.106 (1.11)	0.000 (0.00)	0.590 (0.49)	1.441 (0.74)	2.240 (0.86)	3.187 (0.97)
Log Real Household Income <sup>(a)</sup>	4702 (3335)	3255.28 (3203.6)	5183.9 (3805.8)	5286.748 (3043.64)	5139.284 (2662.89)	4458.053 (2756.82)	8513 (6552)	6435.955 (6000.11)	8975.843 (6380.98)	9364.045 (6103.51)	9145.471 (7449.44)	9241.673 (8116.24)	9640 (7819)	7387.544 (8902.19)	10481.6 (8331.9)	10414.36 (6801.47)	9589.31 (6028.72)	11938.72 (7904.44)
Couple Household	0.817 (0.39)	0.481 (0.50)	0.874 (0.33)	0.955 (0.21)	0.964 (0.19)	0.947 (0.22)	0.828 (0.38)	0.446 (0.50)	0.911 (0.28)	0.971 (0.17)	0.977 (0.15)	0.959 (0.20)	0.811 (0.39)	0.424 (0.49)	0.883 (0.32)	0.973 (0.16)	0.941 (0.24)	0.989 (0.10)
Working Spouse	0.373 (0.48)	0.230 (0.42)	0.399 (0.49)	0.457 (0.50)	0.380 (0.49)	0.368 (0.49)	0.491 (0.50)	0.253 (0.44)	0.582 (0.49)	0.601 (0.49)	0.517 (0.50)	0.429 (0.50)	0.505 (0.50)	0.279 (0.45)	0.602 (0.49)	0.625 (0.48)	0.554 (0.50)	0.352 (0.48)
Has Two Children with Same Sex	0.102 (0.30)	0.000 (0.00)	0.000 (0.00)	0.297 (0.46)	0.000 (0.00)	0.000 (0.00)	0.092 (0.29)	0.000 (0.00)	0.000 (0.00)	0.267 (0.44)	0.000 (0.00)	0.000 (0.00)	0.087 (0.28)	0.000 (0.00)	0.000 (0.00)	0.264 (0.44)	0.000 (0.00)	0.000 (0.00)
Age of Spouse	33.132 (6.51)	32.225 (6.93)	32.373 (7.67)	33.448 (5.77)	34.515 (4.80)	36.592 (4.92)	33.760 (6.48)	32.466 (6.72)	33.181 (8.01)	34.401 (5.87)	34.935 (4.92)	34.735 (4.38)	34.069 (6.35)	32.318 (6.66)	34.512 (7.63)	34.578 (5.73)	34.858 (4.92)	35.242 (4.55)
Age of Head	39.856 (10.50)	46.786 (14.35)	37.390 (9.33)	37.207 (6.83)	38.142 (5.69)	39.197 (5.38)	39.768 (9.64)	45.133 (13.78)	37.525 (9.08)	38.083 (6.10)	38.316 (5.31)	38.347 (6.37)	41.033 (9.85)	47.464 (13.63)	39.448 (8.98)	38.152 (6.04)	39.191 (5.80)	39.615 (4.85)
Living in Rural	0.317 (0.47)	0.304 (0.46)	0.275 (0.45)	0.311 (0.46)	0.383 (0.49)	0.526 (0.50)	0.305 (0.46)	0.243 (0.43)	0.255 (0.44)	0.300 (0.46)	0.445 (0.50)	0.449 (0.50)	0.348 (0.48)	0.297 (0.46)	0.330 (0.47)	0.324 (0.47)	0.446 (0.50)	0.527 (0.50)
Number of Additional Adults	0.436 (0.86)	0.686 (1.00)	0.566 (1.02)	0.264 (0.66)	0.238 (0.63)	0.197 (0.57)	0.381 (0.76)	0.687 (0.96)	0.513 (0.82)	0.193 (0.55)	0.179 (0.55)	0.204 (0.54)	0.387 (0.73)	0.581 (0.86)	0.611 (0.85)	0.211 (0.53)	0.201 (0.53)	0.154 (0.56)
<i>Birth Spacing(b):</i>																		
1st to 2nd parity	3.36	(2.44)					3.24	(2.15)					3.35	(2.21)				
2st to 3nd parity	3.46	(2.18)					3.89	(2.61)					4.03	(2.85)				
3rd to 4th parity	3.25	(2.32)					3.52	(2.30)					3.55	(2.31)				
4th to 5th parity	2.80	(1.91)					3.19	(1.54)					3.91	(2.75)				
<i>Female Children age 18-23:</i>																		
Unmarried	0.88	(0.332)					0.91	(0.28)					0.89	(0.32)				
Unmarried & in Education	0.15	(0.36)					0.33	(0.47)					0.43	(0.49)				
<i>Male Children age 18-25:</i>																		
Unmarried	0.99	(0.09)					0.99	(0.79)					0.98	(0.14)				
Unmarried & in Education	0.15	(0.36)					0.25	(0.43)					0.30	(0.46)				
Observations	2262	570	539	774	303	76	3204	798	674	1108	526	98	1484	377	324	488	204	91
% Total Sample	1.00	0.25	0.24	0.34	0.13	0.03	1.00	0.25	0.21	0.35	0.16	0.03	1.00	0.25	0.22	0.33	0.14	0.06

Note : Numbers in parenthesis denote the standard deviation. (a) Log Real Household Income excludes the cash child benefit and labor income of the spouse. (b) Birth spacing is in years.

**FIGURE 1:**  
**NUMBER OF BIRTHS BY PARITY (1982-1998)**



**FIGURE 2:**  
**TOTAL NUMBER OF BIRTHS**



*Note:* The very thick (red) lines show the year of the independence (1960) and war (1974). The lighter thick (red) line shows the introduction of child benefits (1988). The lighter (red) lines shows the years of the FES individual data (1984/85, 1990/91, 1996/97). The data after 1974 refer to the area controlled by the government of the Republic of Cyprus.

*Source:* CYSTAT, Demographic Reports.

**TABLE 3: MARGINAL PROBIT ESTIMATES - ALL FAMILIES AND MARRIED FAMILIES WITH TWO AND THREE CHILDREN AGE 2-17**

VARIABLES	ALL FAMILIES WITH TWO AND THREE CHILDREN AGE 2-17						MARRIED FAMILIES WITH TWO AND THREE CHILDREN AGE 2-17					
	POST REFORM SURVEY(S)						POST REFORM SURVEY(S)					
	FES 90/91 & FES 96/97	FES 90/91	FES 96/97				FES 90/91 & FES 96/97	FES 90/91	FES 96/97			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post Reform 1990/91 Dummy	-0.00859 (-0.687)	-0.00965 (-1.052)	-9.64e-05 (-0.00722)	-0.0104 (-1.109)			-0.00738 (-0.561)	-0.00863 (-0.926)	0.000856 (0.0612)	-0.00882 (-0.926)		
Post Reform 1996/97 Dummy	-0.0107 (-0.854)	-0.0164 (-1.514)			-0.0249** (-2.134)	-0.0192 (-1.600)	-0.00901 (-0.685)	-0.0161 (-1.455)			-0.0246** (-2.004)	-0.0123 (-1.016)
Post91*Has Three Children Age 2-17 Dummy	0.0119 (0.639)	0.0106 (0.484)	0.0106 (0.580)	0.0108 (0.495)			0.0103 (0.547)	0.00881 (0.401)	0.00895 (0.487)	0.00880 (0.401)		
Post96*Has Three Children Age 2-17 Dummy	0.0586* (1.954)	0.0557* (1.704)			0.0585** (2.421)	0.0568* (1.721)	0.0572* (1.880)	0.0565* (1.694)			0.0589** (2.369)	0.0577* (1.743)
Has Three Children Age 2-17 Dummy	-0.0320*** (-2.676)	-0.0371*** (-2.606)	-0.0319*** (-2.666)	-0.0374*** (-2.602)	-0.0248*** (-2.875)	-0.0384*** (-2.602)	-0.0318*** (-2.579)	-0.0363** (-2.491)	-0.0314** (-2.573)	-0.0366** (-2.490)	-0.0251*** (-2.826)	-0.0388*** (-2.689)
Sex Ratio Index	0.511 (0.826)		0.0255 (0.0330)		-0.0947 (-0.189)		0.617 (0.950)		0.185 (0.227)		-0.0327 (-0.0617)	
Has Two Children with Same Sex	0.00334 (0.445)		0.00372 (0.450)		0.00836 (1.056)		0.00147 (0.192)		0.00149 (0.178)		0.00594 (0.736)	
Log Real Household Income	0.00237 (0.502)		-0.000457 (-0.0903)		0.00992* (1.863)		0.000248 (0.0488)		-0.00361 (-0.652)		0.00813 (1.417)	
Couple Household	0.0247 (1.435)		0.0220 (1.126)		0.00945 (0.548)							
Working Spouse	-0.0177*** (-2.812)		-0.0172** (-2.470)		-0.0174*** (-2.674)		-0.0180*** (-2.789)		-0.0172** (-2.432)		-0.0178*** (-2.646)	-0.0313*** (-2.955)
Age of Spouse	-0.000509 (-0.280)		-0.00148 (-0.773)		0.00110 (0.645)		-0.000833 (-0.445)		-0.00180 (-0.925)		0.000711 (0.400)	
Age of Spouse Square	-0.000172* (-1.707)		-0.000121 (-1.143)		-0.000228** (-2.488)		-0.000174* (-1.688)		-0.000123 (-1.143)		-0.000238** (-2.483)	
Age of Head	-0.000595 (-0.704)		-0.000759 (-0.764)		-0.000578 (-0.705)		-0.000277 (-0.290)		-0.000356 (-0.317)		-0.000135 (-0.136)	
Number of Additional Adults	-0.00253 (-0.348)		-1.18e-05 (-0.00158)		-0.00290 (-0.390)		-0.00141 (-0.190)		0.00159 (0.209)		-0.00139 (-0.176)	
Observations	3,378	3,378	2,689	2,689	1,752	1,752	3,288	3,288	2,621	2,621	1,698	1,698
Pseudo R2	0.0843	0.0123	0.0940	0.0149	0.116	0.0121	0.0823	0.0116	0.0932	0.0143	0.113	0.0233

Note : Robust z-statistics in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. In specifications 1-6, the reference is the family with two children age 2-17. In specifications 7-12, the reference is the married family with two children age 2-17.

**TABLE 4: MARGINAL PROBIT ESTIMATES - ALL FAMILIES AND MARRIED FAMILIES WITH MORE THAN ONE CHILD AGE 2-17**

VARIABLES	ALL FAMILIES WITH MORE THAN ONE CHILD AGE 2-17						MARRIED FAMILIES WITH MORE THAN ONE CHILD AGE 2-17					
	POST REFORM SURVEY(S)						POST REFORM SURVEY(S)					
	FES 90/91 & FES 96/97		FES 90/91		FES 96/97		FES 90/91 & FES 96/97		FES 90/91		FES 96/97	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post Reform 1990/91 Dummy	-0.00404 (-0.339)	-0.0101 (-1.109)	0.00179 (0.137)	-0.0105 (-1.109)			-0.00240 (-0.193)	-0.00863 (-0.926)	0.00303 (0.225)	-0.00899 (-0.926)		
Post Reform 1996/97 Dummy	-0.00856 (-0.701)	-0.0173 (-1.600)			-0.0161 (-1.531)	-0.0188 (-1.600)	-0.00638 (-0.497)	-0.0162 (-1.455)			-0.0149 (-1.357)	-0.0174 (-1.454)
Post91*Has Three Children Age 2-17 Dummy	0.0111 (0.616)	0.0108 (0.495)	0.0110 (0.604)	0.0110 (0.495)			0.00913 (0.505)	0.00884 (0.401)	0.00891 (0.490)	0.00899 (0.401)		
Post91*Has More Than Three Children Age 2-17 Dummy	0.0211 (0.680)	0.0404 (1.023)	0.0231 (0.719)	0.0412 (1.023)			0.0166 (0.547)	0.0389 (0.973)	0.0175 (0.565)	0.0395 (0.973)		
Post96*Has Three Children Age 2-17 Dummy	0.0576* (1.955)	0.0566* (1.721)			0.0524** (2.342)	0.0558* (1.721)	0.0564* (1.883)	0.0567* (1.694)			0.0532** (2.306)	0.0558* (1.694)
Post96*Has More Than hree Children Age 2-17 Dummy	-0.0166 (-0.660)	-0.0171 (-0.522)			-0.00977 (-0.544)	-0.0176 (-0.522)	-0.0179 (-0.709)	-0.0195 (-0.599)			-0.0122 (-0.713)	-0.0201 (-0.599)
Has Three Children Age 2-17 Dummy	-0.0525*** (-3.706)	-0.0365*** (-2.603)	-0.0536*** (-3.576)	-0.0376*** (-2.603)	-0.0358*** (-3.179)	-0.0366*** (-2.602)	-0.0532*** (-3.651)	-0.0358** (-2.491)	-0.0539*** (-3.518)	-0.0368** (-2.490)	-0.0253*** (-2.979)	-0.0358** (-2.490)
Has More than Three Children Age 2-17 Dummy	-0.0378* (-1.887)	-0.0102 (-0.456)	-0.0374* (-1.738)	-0.0105 (-0.456)	-0.0258 (-1.537)	-0.0105 (-0.456)	-0.0385* (-1.891)	-0.00829 (-0.356)	-0.0375* (-1.735)	-0.00847 (-0.356)	-0.0105 (-0.633)	-0.00845 (-0.356)
Number of Children Age 2-5	0.0378** (2.528)		0.0359** (2.224)		0.0211 (1.425)		0.0398*** (2.593)		0.0374** (2.285)			
Number of Children Age 6-17	0.0429*** (3.056)		0.0420*** (2.775)		0.0283** (2.064)		0.0452*** (3.125)		0.0439*** (2.845)		0.00950* (1.897)	
Number of Children Age 2-5*Number of Children Age 6-17	-0.0101*** (-2.609)		-0.00999** (-2.276)		-0.00296 (-0.818)		-0.0109*** (-2.750)		-0.0108** (-2.424)		-0.00194 (-0.558)	
Sex Ratio Index	0.194 (0.328)		-0.237 (-0.308)		-0.147 (-0.328)		0.309 (0.506)		-0.0487 (-0.0619)		-0.107 (-0.226)	
Has Two Children with Same Sex	0.00328 (0.447)		0.00289 (0.354)		0.00819 (1.122)		0.00135 (0.182)		0.000473 (0.0574)		0.00593 (0.799)	
Log Real Household Income	0.00215 (0.478)		-0.000482 (-0.0967)		0.00897* (1.904)		-0.000279 (-0.0579)		-0.00430 (-0.804)		0.00732 (1.431)	
Couple Household	0.0282* (1.849)		0.0274 (1.534)		0.0114 (0.750)							
Working Spouse	-0.0206*** (-3.526)		-0.0216*** (-3.240)		-0.0150*** (-2.654)		-0.0210*** (-3.505)		-0.0217*** (-3.213)		-0.0154*** (-2.650)	
Age of Spouse	-0.000566 (-0.292)		-0.00137 (-0.651)		-3.76e-05 (-0.0215)		-0.000783 (-0.396)		-0.00153 (-0.723)		-0.000817 (-0.457)	
Age of Spouse Square	-0.000209* (-1.944)		-0.000171 (-1.464)		-0.000206** (-2.244)		-0.000213* (-1.931)		-0.000174 (-1.466)		-0.000195** (-2.101)	
Age of Head	-0.000978 (-1.151)		-0.00125 (-1.224)		-0.000566 (-0.741)		-0.000818 (-0.879)		-0.00106 (-0.951)		-0.000211 (-0.230)	
Observations	3,642	3,642	2,862	2,862	1,918	1,918	3,544	3,544	2,787	2,787	1,860	1,860
Pseudo R2	0.0968	0.0139	0.103	0.0153	0.124	0.0138	0.0957	0.0136	0.103	0.0150	0.120	0.0128

Note : Robust z-statistics in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. In specifications 1-6, the reference is the family with two children age 2-17. In specifications 7-12, the reference is the married family with two children age 2-17. The estimate of the number of additional adults in the family is insignificant across all specifications.



**TABLE 5: MARGINAL PROBIT ESTIMATES - ALL FAMILIES AND MARRIED FAMILIES**

VARIABLES	ALL FAMILIES						MARRIED FAMILIES					
	POST REFORM SURVEY(S)						POST REFORM SURVEY(S)					
	FES 90/91 & FES 96/97		FES 90/91		FES 96/97		FES 90/91 & FES 96/97		FES 90/91		FES 96/97	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post Reform 1990/91 Dummy	-0.0241*	-0.0157	-0.0275*	-0.0166			-0.0255*	-0.0138	-0.0284*	-0.0146		
	(-1.959)	(-1.109)	(-1.949)	(-1.109)			(-1.811)	(-0.926)	(-1.767)	(-0.926)		
Post Reform 1996/97 Dummy	-0.0248**	-0.0274			-0.0299*	-0.0300	-0.0261*	-0.0263			-0.0304*	-0.0284
	(-2.005)	(-1.600)			(-1.843)	(-1.600)	(-1.821)	(-1.455)			(-1.704)	(-1.455)
Post91*Has No child Age 2-17 Dummy	-0.0207*	-0.0262	-0.0217*	-0.0274			-0.0223	-0.0168	-0.0232	-0.0176		
	(-1.671)	(-1.372)	(-1.652)	(-1.372)			(-1.531)	(-0.767)	(-1.515)	(-0.767)		
Post91*Has One Child Age 2-17 Dummy	-0.00431	-0.00179	-0.00324	-0.00186			-0.00669	-0.00631	-0.00578	-0.00656		
	(-0.342)	(-0.0942)	(-0.243)	(-0.0942)			(-0.474)	(-0.318)	(-0.387)	(-0.318)		
Post91*Has Three Children Age 2-17 Dummy	0.0146	0.0169	0.0149	0.0175			0.0128	0.0141	0.0131	0.0146		
	(0.632)	(0.495)	(0.618)	(0.495)			(0.501)	(0.401)	(0.493)	(0.401)		
Post91*Has More Than Three Children Age 2-17 Dummy	0.0166	0.0606	0.0192	0.0625			0.0141	0.0596	0.0169	0.0615		
	(0.441)	(1.023)	(0.487)	(1.023)			(0.340)	(0.973)	(0.388)	(0.973)		
Post96 *Has No child Age 2-17 Dummy	0.00116	0.00711			-0.00649	0.00737	0.00461	0.0161			-0.00349	0.0165
	(0.0621)	(0.258)			(-0.358)	(0.258)	(0.206)	(0.515)			(-0.165)	(0.515)
Post96*Has One Child Age 2-17 Dummy	-0.0110	-0.0294			-0.0162	-0.0311	-0.0165	-0.0353			-0.0209	-0.0371
	(-0.713)	(-1.350)			(-1.045)	(-1.350)	(-0.964)	(-1.566)			(-1.261)	(-1.566)
Post96*Has Three Children Age 2-17 Dummy	0.0771**	0.0843*			0.0897**	0.0859*	0.0788*	0.0862*			0.0901**	0.0872*
	(2.048)	(1.721)			(2.273)	(1.721)	(1.922)	(1.695)			(2.165)	(1.694)
Post96 *Has More Than Three Children Age 2-17 Dummy	-0.0242	-0.0275			-0.0201	-0.0287	-0.0301	-0.0323			-0.0251	-0.0335
	(-0.781)	(-0.522)			(-0.577)	(-0.522)	(-0.873)	(-0.599)			(-0.687)	(-0.599)
Has No Children Age 2-17 Dummy	0.646***	0.117***	0.629***	0.121***	0.606***	0.121***	0.719***	0.178***	0.702***	0.183***	0.675***	0.181***
	(7.208)	(5.752)	(6.604)	(5.751)	(5.232)	(5.751)	(7.255)	(7.206)	(6.634)	(7.206)	(5.308)	(7.206)
Has One Children Age 2-17 Dummy	0.298***	0.144***	0.294***	0.148***	0.295***	0.147***	0.328***	0.166***	0.323***	0.170***	0.319***	0.168***
	(8.136)	(7.839)	(7.545)	(7.839)	(6.467)	(7.839)	(8.173)	(8.376)	(7.562)	(8.375)	(6.493)	(8.375)
Has Three Children Age 2-17 Dummy	-0.0616***	-0.0540***	-0.0643***	-0.0563***	-0.0600***	-0.0558***	-0.0721***	-0.0551**	-0.0754***	-0.0575**	-0.0669***	-0.0563**
	(-4.927)	(-2.603)	(-4.649)	(-2.603)	(-3.968)	(-2.603)	(-4.836)	(-2.491)	(-4.577)	(-2.491)	(-3.969)	(-2.490)
More than Three Children Age 2-17 Dummy	-0.0496***	-0.0161	-0.0508**	-0.0167	-0.0519**	-0.0168	-0.0579***	-0.0134	-0.0592**	-0.0139	-0.0574**	-0.0139
	(-2.700)	(-0.456)	(-2.412)	(-0.456)	(-2.068)	(-0.456)	(-2.690)	(-0.356)	(-2.409)	(-0.356)	(-2.096)	(-0.356)
Number of Children Age 2-5	0.0646***		0.0650***		0.0516**		0.0749***		0.0748***		0.0588**	
	(3.957)		(3.555)		(2.284)		(3.997)		(3.560)		(2.362)	

**TABLE 5: MARGINAL PROBIT ESTIMATES - ALL FAMILIES AND MARRIED FAMILIES (continued)**

VARIABLES	ALL FAMILIES						MARRIED FAMILIES					
	POST REFORM SURVEY(S)						POST REFORM SURVEY(S)					
	FES 90/91 & FES 96/97		FES 90/91		FES 96/97		FES 90/91 & FES 96/97		FES 90/91		FES 96/97	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Number of Children Age 6-17	0.0740*** (4.742)		0.0735*** (4.207)		0.0691*** (3.226)		0.0850*** (4.739)		0.0845*** (4.201)		0.0768*** (3.247)	
Number of Children 2-5*Number of Children 6-17	-0.0145*** (-3.091)		-0.0156*** (-2.820)		-0.00734 (-1.206)		-0.0170*** (-3.189)		-0.0181*** (-2.893)		-0.00887 (-1.326)	
Sex Ratio Index	0.799* (1.950)		1.032* (1.872)		0.419 (0.944)		1.070** (2.280)		1.275** (2.003)		0.621 (1.262)	
Has Two Children with Same Sex	0.00189 (0.207)		0.000802 (0.0765)		0.0155 (1.138)		-0.00204 (-0.201)		-0.00433 (-0.375)		0.00908 (0.643)	
Log Real Household Income	0.00769* (1.960)		0.00766* (1.668)		0.00715 (1.227)		0.0103** (2.212)		0.00981* (1.792)		0.0103 (1.543)	
Couple Household	0.0635*** (8.922)		0.0667*** (7.844)		0.0618*** (6.649)							
Working Spouse	-0.0284*** (-5.736)		-0.0302*** (-5.311)		-0.0250*** (-3.537)		-0.0335*** (-5.812)		-0.0356*** (-5.396)		-0.0284*** (-3.623)	
Age of Spouse	0.00170 (1.444)		0.00164 (1.202)		0.00175 (1.139)		0.00219 (1.629)		0.00222 (1.432)		0.00224 (1.339)	
Age of Spouse Square	-0.000559*** (-7.479)		-0.000578*** (-6.626)		-0.000621*** (-6.741)		-0.000654*** (-7.701)		-0.000677*** (-6.831)		-0.000718*** (-7.236)	
Age of Head	-0.000325 (-0.475)		0.000114 (0.132)		-0.00117 (-1.257)		-0.000231 (-0.283)		0.000134 (0.129)		-0.000938 (-0.874)	
Number of Additional Adults	-0.00174 (-0.285)		-0.00221 (-0.305)		0.0105 (1.535)		-0.00129 (-0.179)		-0.00175 (-0.204)		0.0139* (1.807)	
Observations	6,279	6,279	4,953	4,953	3,341	3,341	5,705	5,705	4,502	4,502	3,051	3,051
Pseudo R2	0.253	0.0715	0.255	0.0742	0.260	0.0751	0.243	0.0907	0.245	0.0924	0.259	0.0957

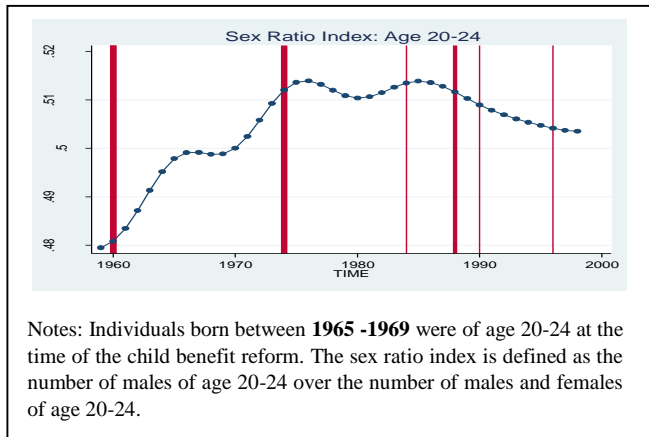
Note: Robust z-statistics in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. In specifications 1-6, the reference is the family with two children age 2-17. In specifications 7-12, the reference is the married family with two children age 2-17.

## APPENDIX

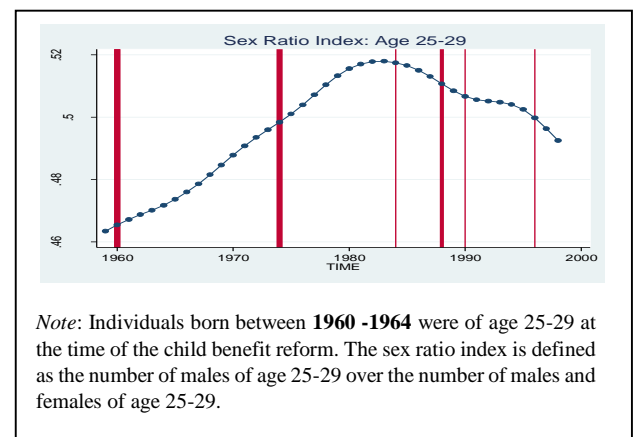
**TABLE 1A: SUMMARY STATISTICS OF MACRO FERTILITY INDICATORS**

	BEFORE REFORM: 1980-1989				AFTER REFORM: 1990-2002			
Fertility Indicators	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Total Fertility Rate	2.42	0.06	2.32	2.50	1.97	0.34	1.49	2.49
Total Number of Births	10585.00	301.17	10099.00	11005.00	9537.85	1099.80	7883.00	11372.00
Total Number of First Birth	4255.60	301.68	3791.00	4726.00	3473.00	379.37	3026.00	4145.00
Total Number of Second Birth	3886.40	151.08	3657.00	4104.00	3206.92	433.29	2551.00	3826.00
Total Number of Third Birth	1823.20	180.35	1463.00	2021.00	1803.85	330.83	1195.00	2249.00
Total Number of Forth Birth	449.40	80.16	327.00	559.00	714.77	160.54	461.00	931.00
Total Number of Fifth to Eighth Birth	149.90	14.00	126.00	178.00	231.08	40.97	154.00	290.00
<i>Source</i> : The data are obtained from the Statistical Service of Cyprus.								

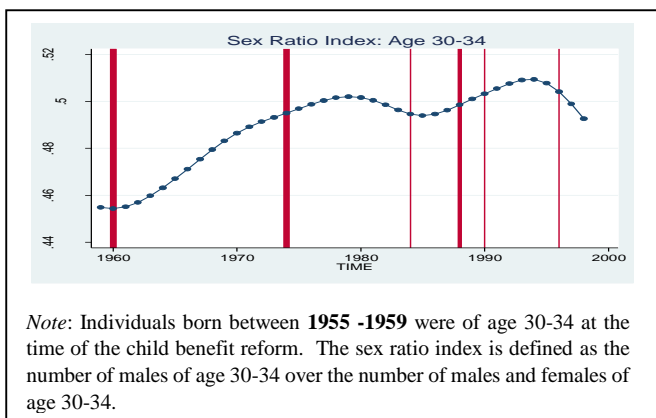
**FIGURE 1A**



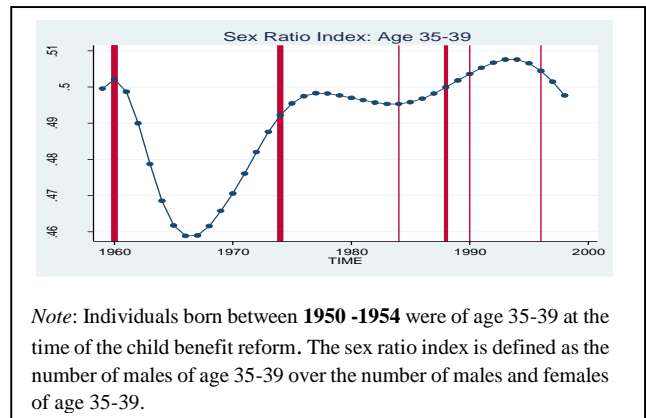
**FIGURE 2A**



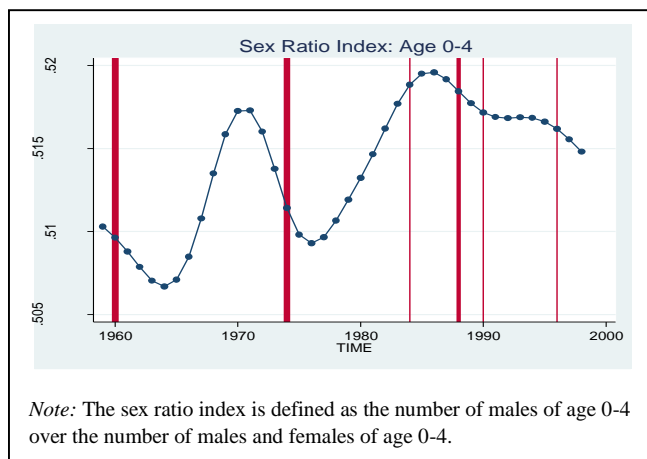
**FIGURE 3A**



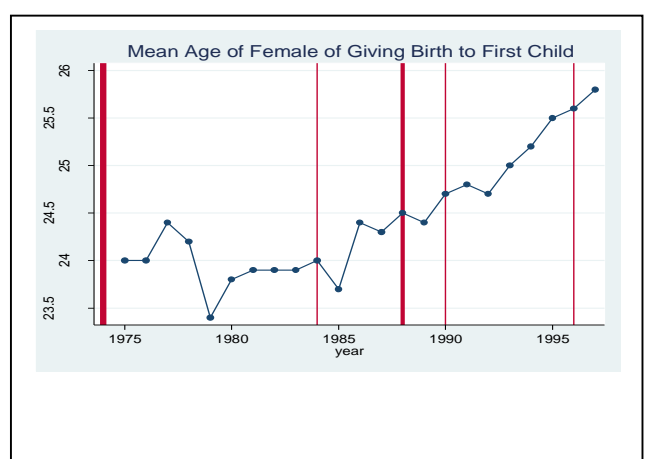
**FIGURE 4A**



**FIGURE 5A**



**FIGURE 6A**



Note: In Figures 1A-6A, the very thick lines show the year of the independence (1960) and war (1974). The lighter thick line shows the introduction of child benefits (1988). The lighter lines show the years of the FES individual data (1984/85, 1990/91, 1996/97). The data after 1974 refer to the area controlled by the government of the Republic of Cyprus.

Sources: Figures 1A-5A are based on the OECD database; Figure 8 is based on Demographic Reports, CYSTAT, Cyprus.

**TABLE 2A: MARGINAL PROBIT ESTIMATES - MARRIAGE BEHAVIOR AND EDUCATIONAL OUTCOMES OF THE YOUTH**

	UNMARRIED AND IN EDUCATION						IN EDUCATION					
	POST REFORM SURVEY(S)						POST REFORM SURVEY(S)					
	FES 90/91 & FES 96/97	FES 90/91	FES 90/91	FES 96/97	FES 90/91	FES 96/97	FES 90/91 & FES 96/97	FES 90/91	FES 90/91	FES 96/97	FES 90/91	FES 96/97
	Male Children Age 18-25	Female Children Age 18-23	Male Children Age 18-25	Female Children Age 18-23	Male Children Age 18-25	Female Children Age 18-23	Male Children Age 18-25	Female Children Age 18-23	Male Children Age 18-25	Female Children Age 18-23	Male Children Age 18-25	Female Children Age 18-23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post Reform 1990/91 Dummy	0.105 (1.143)	0.324*** (2.890)	0.0921 (1.143)	0.277*** (2.889)			0.105 (1.143)	0.358*** (3.188)	0.0921 (1.143)	0.308*** (3.187)		
Post Reform 1996/97 Dummy	0.126 (1.352)	0.285*** (2.698)			0.119 (1.351)	0.264*** (2.697)	0.147 (1.569)	0.287*** (2.698)			0.137 (1.568)	0.265*** (2.697)
Post91*Family Has Two Children	0.0753 (0.685)	-0.103 (-0.935)	0.0686 (0.685)	-0.0891 (-0.935)			0.0755 (0.685)	-0.136 (-1.274)	0.0686 (0.685)	-0.118 (-1.274)		
Post91*Family Has Three Children	-0.0681 (-0.693)	-0.126 (-1.058)	-0.0620 (-0.693)	-0.107 (-1.058)			-0.0683 (-0.693)	-0.148 (-1.275)	-0.0620 (-0.693)	-0.126 (-1.275)		
Post91*Family Has More Than Three Children	-0.159 (-1.536)	-0.119 (-0.870)	-0.142 (-1.535)	-0.100 (-0.870)			-0.159 (-1.536)	-0.140 (-1.056)	-0.142 (-1.535)	-0.118 (-1.055)		
Post96*Family Has Two Children	0.0841 (0.754)	0.0466 (0.388)			0.0816 (0.754)	0.0446 (0.387)	0.0635 (0.579)	0.0351 (0.293)			0.0618 (0.579)	0.0336 (0.293)
Post96*Family Has Three Children	-0.0672 (-0.680)	0.0233 (0.173)			-0.0663 (-0.680)	0.0224 (0.173)	-0.0825 (-0.856)	0.0234 (0.173)			-0.0818 (-0.855)	0.0225 (0.173)
Post96*Family Has More Than Three Children	0.0568 (0.438)	-0.0661 (-0.507)			0.0556 (0.438)	-0.0632 (-0.507)	0.0365 (0.288)	-0.0666 (-0.507)			0.0358 (0.288)	-0.0635 (-0.507)
Family Has Two Children	-0.00732 (-0.0920)	0.101 (1.218)	-0.00667 (-0.0919)	0.0886 (1.218)	-0.00717 (-0.0919)	0.0976 (1.218)	-0.00734 (-0.0920)	0.113 (1.357)	-0.00667 (-0.0919)	0.0996 (1.357)	-0.00720 (-0.0919)	0.109 (1.357)
Family Has Three Children	0.0475 (0.578)	0.0201 (0.210)	0.0435 (0.578)	0.0175 (0.210)	0.0466 (0.578)	0.0193 (0.210)	0.0476 (0.578)	0.0202 (0.210)	0.0435 (0.578)	0.0177 (0.210)	0.0467 (0.578)	0.0194 (0.210)
Family Has More Than Three Children	-0.0667 (-0.852)	0.0647 (0.678)	-0.0607 (-0.852)	0.0568 (0.677)	-0.0656 (-0.852)	0.0621 (0.678)	-0.0668 (-0.852)	0.0650 (0.678)	-0.0607 (-0.852)	0.0573 (0.677)	-0.0658 (-0.852)	0.0624 (0.678)
Observations	968	703	666	492	654	516	968	703	666	492	654	516
Pseudo R2	0.0423	0.0768	0.0431	0.0506	0.0403	0.0988	0.0428	0.0764	0.0431	0.0526	0.0412	0.0969

Note: Robust z-statistics in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The estimates are based on the observations of male children age 18-23 of the family and female children age 18-25 in the family. The multi-member family has more than three children and the non-multi-member family has less than four children.

**TABLE 3A: LINEAR PROBABILITY ESTIMATES - ALL FAMILIES AND MARRIED FAMILIES WITH TWO AND THREE CHILDREN AGE 2-17**

VARIABLES	ALL FAMILIES WITH TWO AND THREE CHILDREN AGE 2-17						MARRIED FAMILIES WITH TWO AND THREE CHILDREN AGE 2-17					
	POST REFORM SURVEY(S)						POST REFORM SURVEY(S)					
	FES 90/91 & FES 96/97	FES 90/91	FES 96/97				FES 90/91 & FES 96/97	FES 90/91	FES 96/97			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post Reform 1990/91 Dummy	-0.0155 (-0.851)	-0.0124 (-1.093)	-0.00453 (-0.220)	-0.0124 (-1.093)			-0.0132 (-0.700)	-0.0105 (-0.914)	-0.00189 (-0.0893)	-0.0105 (-0.915)		
Post Reform 1996/97 Dummy	-0.0192 (-1.074)	-0.0217* (-1.659)			-0.0494** (-2.225)	-0.0217* (-1.658)	-0.0168 (-0.913)	-0.0200 (-1.502)			-0.0471** (-1.997)	-0.0200 (-1.502)
Post91*Has Three Children Age 2-17 Dummy	0.0137 (0.832)	0.0124 (0.764)	0.0120 (0.730)	0.0124 (0.765)			0.0117 (0.699)	0.0104 (0.625)	0.00992 (0.592)	0.0104 (0.625)		
Post96*Has Three Children Age 2-17 Dummy	0.0423* (1.944)	0.0396* (1.828)			0.0511** (2.310)	0.0396* (1.827)	0.0411* (1.818)	0.0395* (1.762)			0.0506** (2.206)	0.0395* (1.762)
Has Three Children Age 2-17 Dummy	-0.0385*** (-2.917)	-0.0402*** (-3.094)	-0.0379*** (-2.864)	-0.0402*** (-3.095)	-0.0390*** (-2.895)	-0.0402*** (-3.094)	-0.0377*** (-2.795)	-0.0389*** (-2.938)	-0.0372*** (-2.746)	-0.0389*** (-2.939)	-0.0387*** (-2.809)	-0.0389*** (-2.937)
Sex Ratio Index	0.859 (0.956)		0.144 (0.123)		0.190 (0.184)		0.898 (0.961)		0.205 (0.171)		0.185 (0.172)	
Has Two Children with Same Sex	0.00792 (0.679)		0.00862 (0.654)		0.0239 (1.421)		0.00507 (0.432)		0.00509 (0.386)		0.0185 (1.096)	
Log Real Household Income	0.00449 (0.918)		0.00281 (0.488)		0.0162** (2.516)		0.00307 (0.550)		0.000228 (0.0338)		0.0125 (1.572)	
Couple Household	0.0485** (2.428)		0.0458* (1.752)									
Working Spouse	-0.0205*** (-2.703)		-0.0205** (-2.453)		-0.0257** (-2.508)		-0.0206*** (-2.710)		-0.0206** (-2.452)		-0.0271** (-2.565)	
Age of Spouse	-0.00575* (-1.910)		-0.00735** (-2.138)		-0.00376 (-1.047)		-0.00581* (-1.918)		-0.00740** (-2.146)		-0.00388 (-1.070)	
Age of Spouse Square	7.94e-05 (0.623)		0.000152 (1.031)		-3.51e-05 (-0.240)		7.62e-05 (0.598)		0.000145 (0.987)		-4.92e-05 (-0.335)	
Age of Head	-0.000142 (-0.133)		-0.000446 (-0.331)		-4.69e-05 (-0.0323)		-3.14e-05 (-0.0277)		-0.000258 (-0.186)		0.000172 (0.108)	
Number of Additional Adults	-0.00317 (-0.653)		-0.00217 (-0.377)		-0.00536 (-0.834)		-0.00246 (-0.483)		-0.000998 (-0.165)		-0.00322 (-0.456)	
Constant	-0.375 (-0.830)	0.0668*** (7.386)	0.00329 (0.00556)	0.0668*** (7.387)	-0.141 (-0.271)	0.0668*** (7.384)	-0.338 (-0.719)	0.0663*** (7.238)	0.0347 (0.0574)	0.0663*** (7.239)	-0.112 (-0.205)	0.0663*** (7.236)
Observations	3,378	3,378	2,689	2,689	1,752	1,752	3,288	3,288	2,621	2,621	1,698	1,698
R-squared	0.034	0.004	0.039	0.005	0.045	0.005	0.033	0.004	0.039	0.005	0.044	0.004

Note: Robust z-statistics in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. In specifications 1-6, the reference is the family with two children age 2-17. In specifications 7-12, the reference is the married family with two children age 2-17.

**TABLE 4A: LINEAR PROBABILITY ESTIMATES - ALL FAMILIES AND MARRIED FAMILIES WITH MORE THAN ONE CHILD AGE 2-17**

VARIABLES	ALL FAMILIES WITH MORE THAN ONE CHILD AGE 2-17						MARRIED FAMILIES WITH MORE THAN ONE CHILD AGE 2-17					
	POST REFORM SURVEY(S)						POST REFORM SURVEY(S)					
	FES 90/91 & FES 96/97	FES 90/91	FES 96/97				FES 90/91 & FES 96/97	FES 90/91	FES 96/97			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post Reform 1990/91 Dummy	-0.0110 (-0.627)	-0.0124 (-1.092)	-0.00304 (-0.153)	-0.0124 (-1.092)			-0.00797 (-0.439)	-0.0105 (-0.914)	8.02e-05 (0.00394)	-0.0105 (-0.914)		
Post Reform 1996/97 Dummy	-0.0171 (-0.981)	-0.0217* (-1.658)			-0.0343 (-1.612)	-0.0217* (-1.658)	-0.0140 (-0.782)	-0.0200 (-1.502)			-0.0312 (-1.407)	-0.0200 (-1.501)
Post91*Has Three Children Age 2-17 Dummy	0.0131 (0.798)	0.0124 (0.764)	0.0119 (0.723)	0.0124 (0.764)			0.0108 (0.650)	0.0104 (0.625)	0.00952 (0.569)	0.0104 (0.625)		
Post91*Has More than Three Children Age 2-17 Dummy	0.0366 (0.916)	0.0407 (1.027)	0.0360 (0.898)	0.0407 (1.027)			0.0330 (0.801)	0.0401 (0.974)	0.0321 (0.776)	0.0401 (0.974)		
Post96*Has Three Children Age 2-17 Dummy	0.0430** (1.973)	0.0396* (1.827)			0.0499** (2.258)	0.0396* (1.826)	0.0419* (1.855)	0.0395* (1.762)			0.0495** (2.161)	0.0395* (1.761)
Post96*Has More than Three Children Age 2-17 Dummy	-0.00703 (-0.210)	-0.00969 (-0.294)			-0.00714 (-0.212)	-0.00969 (-0.294)	-0.0108 (-0.313)	-0.0133 (-0.393)			-0.0167 (-0.471)	-0.0133 (-0.393)
Has Three Children Age 2-17 Dummy	-0.0990*** (-2.894)	-0.0402*** (-3.093)	-0.104** (-2.574)	-0.0402*** (-3.094)	-0.0930* (-1.959)	-0.0402*** (-3.092)	-0.102*** (-2.880)	-0.0389*** (-2.937)	-0.106** (-2.566)	-0.0389*** (-2.938)	-0.0513*** (-3.045)	-0.0389*** (-2.936)
Has More than Three Children Age 2-17 Dummy	-0.143* (-1.900)	-0.0135 (-0.491)	-0.153* (-1.709)	-0.0135 (-0.491)	-0.129 (-1.237)	-0.0135 (-0.491)	-0.146* (-1.898)	-0.0108 (-0.377)	-0.156* (-1.706)	-0.0108 (-0.377)	-0.0327 (-0.809)	-0.0108 (-0.377)
Number of Children Age 2-5	0.0674* (1.847)		0.0720* (1.659)		0.0480 (0.930)		0.0721* (1.912)		0.0768* (1.717)			
Number of Children Age 6-17	0.0729** (2.150)		0.0786* (1.922)		0.0622 (1.290)		0.0777** (2.211)		0.0834** (1.977)		0.0199** (1.974)	
Number of Children Age 2-5*Number of Children Age 6-17	-0.0149** (-2.191)		-0.0159** (-1.982)		-0.00475 (-0.603)		-0.0162** (-2.314)		-0.0174** (-2.110)		-0.00135 (-0.246)	
Sex Ratio Index	0.507 (0.589)		-0.188 (-0.165)		0.0805 (0.0814)		0.552 (0.615)		-0.0902 (-0.0774)		0.0911 (0.0883)	
Has Two Children with Same Sex	0.00830 (0.712)		0.00833 (0.632)		0.0248 (1.472)		0.00559 (0.476)		0.00487 (0.369)		0.0200 (1.182)	
Log Real Household Income	0.00463 (0.994)		0.00342 (0.618)		0.0136** (2.016)		0.00267 (0.500)		-5.34e-05 (-0.00830)		0.0111 (1.513)	
Couple Household	0.0654*** (3.308)		0.0626** (2.472)		0.0389 (1.280)							
Working Spouse	-0.0258*** (-3.527)		-0.0270*** (-3.283)		-0.0269*** (-2.667)		-0.0259*** (-3.531)		-0.0269*** (-3.280)		-0.0270*** (-2.675)	
Age of Spouse	-0.00565* (-1.671)		-0.00668* (-1.729)		-0.00627 (-1.599)		-0.00574* (-1.685)		-0.00678* (-1.743)		-0.00733* (-1.888)	
Age of Spouse Square	3.13e-05 (0.226)		7.97e-05 (0.495)		4.41e-06 (0.0280)		2.58e-05 (0.185)		6.95e-05 (0.431)		3.74e-05 (0.247)	
Age of Head	-0.000770 (-0.722)		-0.00136 (-0.985)		-2.88e-05 (-0.0206)		-0.000642 (-0.567)		-0.00111 (-0.779)		-4.87e-06 (-0.00325)	
Constant	-0.351 (-0.803)	0.0668*** (7.384)	0.00580 (0.00997)	0.0668*** (7.385)	-0.202 (-0.401)	0.0668*** (7.381)	-0.305 (-0.672)	0.0663*** (7.235)	0.0327 (0.0552)	0.0663*** (7.236)	-0.0579 (-0.111)	0.0663*** (7.233)
Observations	3,642	3,642	2,862	2,862	1,918	1,918	3,544	3,544	2,787	2,787	1,860	1,860
R-squared	0.039	0.005	0.043	0.006	0.047	0.005	0.039	0.005	0.044	0.006	0.045	0.005

Note : Robust z-statistics in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. In specifications 1-6, the reference is the family with two children age 2-17. In specifications 7-12, the reference is the married family with two children age 2-17.

**TABLE 5A: LINEAR PROBABILITY ESTIMATES - ALL FAMILIES AND MARRIED FAMILIES**

VARIABLES	ALL FAMILIES						MARRIED FAMILIES					
	POST REFORM SURVEY(S)						POST REFORM SURVEY(S)					
	FES 90/91 & FES 96/97	FES 90/91	FES 96/97				96/97	FES 90/91	FES 96/97			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post Reform 1990/91 Dummy	-0.0324** (-2.008)	-0.0124 (-1.092)	-0.0369** (-2.086)	-0.0124 (-1.092)			-0.0346** (-1.991)	-0.0105 (-0.914)	-0.0379** (-1.983)	-0.0105 (-0.914)		
Post Reform 1996/97 Dummy	-0.0341** (-2.056)	-0.0217* (-1.658)			-0.0371* (-1.843)	-0.0217* (-1.658)	-0.0367** (-2.087)	-0.0200 (-1.502)			-0.0388* (-1.773)	-0.0200 (-1.501)
Post91*Has No child Age 2-17 Dummy	-0.0522** (-2.115)	-0.0554** (-2.050)	-0.0524** (-2.113)	-0.0554** (-2.051)			-0.0539* (-1.730)	-0.0469 (-1.348)	-0.0547* (-1.756)	-0.0469 (-1.348)		
Post91*Has One Child Age 2-17 Dummy	-0.0245 (-0.982)	-0.0202 (-0.768)	-0.0229 (-0.919)	-0.0202 (-0.768)			-0.0274 (-1.032)	-0.0274 (-0.979)	-0.0260 (-0.980)	-0.0274 (-0.979)		
Post91*Has Three Children Age 2-17 Dummy	0.00702 (0.418)	0.0124 (0.764)	0.00566 (0.336)	0.0124 (0.764)			0.00634 (0.372)	0.0104 (0.625)	0.00495 (0.289)	0.0104 (0.625)		
Post91*Has More Than Three Children Age 2-17 Dummy	0.00811 (0.208)	0.0407 (1.027)	0.00796 (0.203)	0.0407 (1.027)			0.00347 (0.0857)	0.0401 (0.974)	0.00287 (0.0704)	0.0401 (0.974)		
Post96*Has No child Age 2-17 Dummy	-0.0200 (-0.668)	-0.0151 (-0.450)			-0.0225 (-0.746)	-0.0151 (-0.450)	-0.0118 (-0.306)	-0.00474 (-0.109)			-0.0144 (-0.374)	-0.00474 (-0.109)
Post96*Has One Child Age 2-17 Dummy	-0.0639** (-2.324)	-0.0810*** (-2.802)			-0.0666** (-2.418)	-0.0810*** (-2.801)	-0.0732** (-2.493)	-0.0941*** (-3.050)			-0.0756** (-2.568)	-0.0941*** (-3.049)
Post96*Has Three Children Age 2-17 Dummy	0.0427* (1.919)	0.0396* (1.827)			0.0496** (2.210)	0.0396* (1.827)	0.0411* (1.791)	0.0395* (1.761)			0.0486** (2.090)	0.0395* (1.761)
Post96*Has More Than Three Children Age 2-17 Dummy	-0.0322 (-0.942)	-0.00969 (-0.294)			-0.0256 (-0.736)	-0.00969 (-0.294)	-0.0323 (-0.908)	-0.0133 (-0.393)			-0.0248 (-0.686)	-0.0133 (-0.393)
Has No child Age 2-17 Dummy	0.443*** (6.657)	0.116*** (5.216)	0.460*** (6.156)	0.116*** (5.217)	0.400*** (4.474)	0.116*** (5.214)	0.478*** (6.838)	0.171*** (6.257)	0.499*** (6.428)	0.171*** (6.259)	0.435*** (4.563)	0.171*** (6.255)
Has One Children Age 2-17 Dummy	0.289*** (7.837)	0.154*** (7.541)	0.296*** (7.300)	0.154*** (7.543)	0.274*** (5.748)	0.154*** (7.539)	0.306*** (7.946)	0.174*** (7.989)	0.315*** (7.501)	0.174*** (7.991)	0.290*** (5.750)	0.174*** (7.987)
Has Three Children Age 2-17 Dummy	-0.153*** (-4.794)	-0.0402*** (-3.093)	-0.160*** (-4.485)	-0.0402*** (-3.094)	-0.140*** (-3.266)	-0.0402*** (-3.092)	-0.161*** (-4.864)	-0.0389*** (-2.937)	-0.170*** (-4.641)	-0.0389*** (-2.938)	-0.147*** (-3.257)	-0.0389*** (-2.936)
Has More than Three Children Age 2-17 Dummy	-0.237*** (-3.227)	-0.0135 (-0.491)	-0.250*** (-3.029)	-0.0135 (-0.491)	-0.211** (-2.166)	-0.0135 (-0.491)	-0.251*** (-3.309)	-0.0108 (-0.377)	-0.269*** (-3.174)	-0.0108 (-0.377)	-0.226** (-2.197)	-0.0108 (-0.377)
Number of Children Age 2-5	0.110*** (3.306)		0.121*** (3.217)		0.0767* (1.682)		0.117*** (3.409)		0.130*** (3.376)		0.0832* (1.720)	



**TABLE 5A: LINEAR PROBABILITY ESTIMATES - ALL FAMILIES AND MARRIED FAMILIES (continued)**

VARIABLES	ALL FAMILIES						MARRIED FAMILIES					
	POST REFORM SURVEY(S)						POST REFORM SURVEY(S)					
	FES 90/91 & FES 96/97	FES 90/91	FES 96/97				96/97	FES 90/91	FES 96/97			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Number of Children Age 6-17	0.135*** (4.348)		0.142*** (4.025)		0.117*** (2.743)		0.142*** (4.412)		0.151*** (4.178)		0.124*** (2.731)	
Number of Children 2-5*Number of Children 6-17	-0.0232*** (-3.695)		-0.0265*** (-3.646)		-0.0106 (-1.433)		-0.0235*** (-3.631)		-0.0269*** (-3.594)		-0.0110 (-1.432)	
Sex Ratio Index	1.605** (2.345)		2.064** (2.346)		1.075 (1.328)		1.749** (2.283)		2.147** (2.175)		1.214 (1.346)	
Has Two Children with Same Sex	-0.0111 (-0.936)		-0.0122 (-0.906)		0.000699 (0.0410)		-0.0151 (-1.281)		-0.0168 (-1.260)		-0.00602 (-0.358)	
Log Real Household Income	0.00665* (1.786)		0.00630 (1.523)		0.00584 (0.977)		0.0132** (2.222)		0.0129* (1.899)		0.0102 (1.232)	
Couple Household	0.239*** (16.74)		0.244*** (15.00)		0.229*** (11.18)							
Working Spouse	-0.0377*** (-4.859)		-0.0407*** (-4.610)		-0.0306*** (-2.862)		-0.0387*** (-4.991)		-0.0417*** (-4.724)		-0.0320*** (-2.992)	
Age of Spouse	-0.00721*** (-2.873)		-0.00674** (-2.393)		0.00875** (-2.606)		-0.00545** (-2.078)		-0.00504* (-1.717)		-0.00692** (-1.987)	
Age of Spouse Square	-0.000259** (-2.369)		0.000295** (-2.371)		-0.000220 (-1.513)		0.000324** (-2.904)		0.000357** (-2.821)		0.000302** (-2.039)	
Age of Head	-0.000762 (-0.902)		1.23e-05 (0.0115)		-0.00207* (-1.777)		-0.00129 (-1.115)		-0.000554 (-0.382)		-0.00253* (-1.690)	
Number of Additional Adults	-0.0102** (-2.212)		-0.0108** (-2.070)		0.000231 (0.0331)		-0.0125** (-2.253)		-0.0128** (-2.036)		2.89e-05 (0.00353)	
Constant	-1.209*** (-3.436)	0.0668*** (7.384)	-1.463*** (-3.245)	0.0668*** (7.385)	-0.876** (-2.086)	0.0668*** (7.382)	-1.114*** (-2.849)	0.0663*** (7.235)	-1.338*** (-2.670)	0.0663*** (7.236)	-0.769* (-1.651)	0.0663*** (7.232)
Observations	6,279	6,279	4,953	4,953	3,341	3,341	5,705	5,705	4,502	4,502	3,051	3,051
R-squared	0.163	0.047	0.168	0.050	0.174	0.051	0.163	0.064	0.167	0.066	0.178	0.070

Note: Robust z-statistics in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. In specifications 1-6, the reference is the family with two children age 2-17. In specifications 7-12, the reference is the married family with two children age 2-17.

**TABLE 6A: MARGINAL PROBIT ESTIMATES - ALL FAMILIES AND MARRIED FAMILIES WITH TWO AND THREE CHILDREN AGE 2-15**

VARIABLES	ALL FAMILIES WITH TWO AND THREE CHILDREN AGE 2-15						MARRIED FAMILIES WITH TWO AND THREE CHILDREN AGE 2-15					
	POST REFORM SURVEY(S)						POST REFORM SURVEY(S)					
	FES 90/91 & FES96/97	FES 90/91	FES 90/91	FES 90/91	FES96/97	FES96/97	FES 90/91 & FES96/97	FES 90/91	FES 90/91	FES96/97	FES96/97	FES96/97
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post Reform 1990/91 Dummy	-0.0139 (-0.905)	-0.0149 (-1.302)	-0.00201 (-0.115)	-0.0149 (-1.252)			-0.0122 (-0.762)	-0.0135 (-1.144)	-0.000233 (-0.0129)	-0.0139 (-1.144)		
Post Reform 1996/97 Dummy	-0.0163 (-1.121)	-0.0184 (-1.538)			-0.0284** (-2.107)	-0.0198 (-1.500)	-0.0143 (-0.941)	-0.0170 (-1.377)			-0.0280** (-1.975)	-0.0185 (-1.377)
Post91*Has Three Children Age 2-15 Dummy	0.0191 (0.731)	0.0159 (0.528)	0.0159 (0.639)	0.0150 (0.499)			0.0180 (0.684)	0.0144 (0.473)	0.0150 (0.605)	0.0143 (0.473)		
Post96*Has Three Children Age 2-15 Dummy	0.0837** (2.367)	0.0697* (1.871)			0.0766*** (2.592)	0.0693* (1.831)	0.0844** (2.340)	0.0691* (1.829)			0.0799*** (2.608)	0.0704* (1.829)
Has Three Children Age 2-15 Dummy	-0.0363*** (-2.775)	-0.0392** (-2.480)	-0.0350*** (-2.746)	-0.0390** (-2.445)	-0.0292*** (-2.865)	-0.0407** (-2.445)	-0.0365*** (-2.738)	-0.0385** (-2.378)	-0.0351*** (-2.735)	-0.0385** (-2.378)	-0.0300*** (-2.870)	-0.0402** (-2.378)
Sex Ratio Index	0.328 (0.465)		-0.468 (-0.517)		0.0109 (0.0187)		0.369 (0.507)		-0.388 (-0.419)		0.0226 (0.0370)	
Has Two Children with Same Sex	0.00620 (0.679)		0.00700 (0.690)		0.00836 (0.952)		0.00367 (0.396)		0.00382 (0.375)		0.00558 (0.625)	
Log Real Household Income	0.00753 (1.220)		0.00521 (0.767)		0.0118* (1.951)		0.00460 (0.695)		0.000603 (0.0802)		0.00929 (1.431)	
Couple Household	0.0238 (1.191)	0.0229 (0.884)	0.0173 (0.714)		0.0114 (0.578)							
Working Spouse	-0.0177** (-2.288)		-0.0183** (-2.110)		-0.0180** (-2.412)		-0.0180** (-2.284)		-0.0183** (-2.092)		-0.0186** (-2.421)	
Age of Spouse	0.00141 (0.620)		0.000526 (0.212)		0.000166 (0.0820)		0.00141 (0.609)		0.000508 (0.203)		0.000126 (0.0607)	
Age of Spouse Square	-0.000341*** (-2.699)		-0.000298** (-2.109)		-0.000219* (-1.944)		-0.000353*** (-2.750)		-0.000317** (-2.217)		-0.000231** (-2.004)	
Age of Head	-0.000578 (-0.504)		-0.00105 (-0.743)		-3.72e-05 (-0.0339)		-0.000459 (-0.380)		-0.000764 (-0.526)		8.73e-05 (0.0740)	
Number of Additional Adults	-0.00560 (-0.539)		-0.00334 (-0.305)		-0.00611 (-0.659)		-0.00336 (-0.316)		0.000473 (0.0427)		-0.00407 (-0.420)	
Observations	2,295	2,295	1,690	1,690	1,564	1,564	2,233	2,233	1,646	1,646	1,517	1,517
Pseudo R2	0.0863	0.0127	0.103	0.0156	0.108	0.0111	0.0841	0.0111	0.101	0.0148	0.106	0.0105

Note : Robust z-statistics in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. In specifications 1-6, the reference is the family with two children age 2-15. In specifications 7-12, the reference is the married family with two children age 2-15.

**TABLE 7A: MARGINAL PROBIT ESTIMATES FOR ALL FAMILIES AND MARRIED FAMILIES WITH MORE THAN ONE CHILD AGE 2-15**

VARIABLES	ALL FAMILIES WITH MORE THAN ONE CHILD AGE 2-15						MARRIED FAMILIES WITH MORE THAN ONE CHILD AGE 2-15					
	POST REFORM SURVEY(S)						POST REFORM SURVEY(S)					
	FES 90/91 & FES 96/97		FES 90/91		FES 96/97		FES 90/91 & FES 96/97		FES 90/91		FES 96/97	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post Reform 1990/91 Dummy	-0.00802 (-0.545)	-0.0145 (-1.253)	-0.000896 (-0.0535)	-0.0152 (-1.252)			-0.00551 (-0.358)	-0.0135 (-1.144)	0.00145 (0.0847)	-0.0142 (-1.144)		
Post Reform 1996/97 Dummy	-0.0113 (-0.801)	-0.0182 (-1.501)			-0.0183 (-1.490)	-0.0196 (-1.500)	-0.00849 (-0.571)	-0.0171 (-1.377)			-0.0171 (-1.303)	-0.0183 (-1.377)
Post91*Has Three Children Age 2-15 Dummy	0.0158 (0.645)	0.0150 (0.499)	0.0139 (0.588)	0.0153 (0.499)			0.0143 (0.583)	0.0144 (0.473)	0.0128 (0.540)	0.0146 (0.473)		
Post91*Has More Than Three Children Age 2-15 Dummy	0.00901 (0.264)	0.0439 (0.856)	0.00729 (0.220)	0.0448 (0.856)			0.00670 (0.196)	0.0403 (0.785)	0.00469 (0.143)	0.0409 (0.785)		
Post96*Has Three Children Age 2-15 Dummy	0.0796** (2.314)	0.0682* (1.831)			0.0699** (2.532)	0.0688* (1.831)	0.0800** (2.281)	0.0694* (1.829)			0.0734** (2.530)	0.0698* (1.829)
Post96*Has More Than hree Children Age 2-15 Dummy	-0.0243 (-1.051)	-0.0215 (-0.614)			-0.0165 (-0.911)	-0.0225 (-0.614)	-0.0252 (-1.080)	-0.0242 (-0.696)			-0.0179 (-0.950)	-0.0252 (-0.696)
Has Three Children Age 2-15 Dummy	-0.0465* (-1.911)	-0.0383** (-2.446)	-0.0531** (-2.091)	-0.0394** (-2.445)	-0.0335 (-1.416)	-0.0394** (-2.445)	-0.0471* (-1.904)	-0.0380** (-2.378)	-0.0518** (-2.032)	-0.0389** (-2.378)	-0.0294*** (-2.867)	-0.0390** (-2.378)
Has More than Three Children Age 2-15 Dummy	-0.0230 (-0.466)	-0.00195 (-0.0732)	-0.0322 (-0.753)	-0.00199 (-0.0732)	-0.0151 (-0.293)	-0.00202 (-0.0732)	-0.0233 (-0.461)	0.00114 (0.0410)	-0.0301 (-0.664)	0.00116 (0.0410)	-0.000228 (-0.00912)	0.00117 (0.0410)
Number of Children Age 2-5	0.0251 (0.814)		0.0357 (1.037)		0.00873 (0.267)		0.0269 (0.861)		0.0342 (1.007)			
Number of Children Age 6-15	0.0322 (1.072)		0.0438 (1.300)		0.0183 (0.573)		0.0344 (1.124)		0.0425 (1.281)		0.0103* (1.776)	
Number of Children Age 2-5*Number of Children Age 6-15	-0.0115** (-2.257)		-0.0115** (-1.981)		-0.00296 (-0.613)		-0.0126** (-2.437)		-0.0126** (-2.173)		-0.00362 (-0.804)	
Sex Ratio Index	0.0897 (0.137)		-0.526 (-0.613)		-0.0492 (-0.0931)		0.132 (0.194)		-0.414 (-0.472)		-0.0423 (-0.0757)	
Has Two Children with Same Sex	0.00667 (0.755)		0.00652 (0.662)		0.00855 (1.047)		0.00425 (0.476)		0.00340 (0.344)		0.00619 (0.735)	
Log Real Household Income	0.00707 (1.210)		0.00448 (0.686)		0.0111** (2.025)		0.00396 (0.629)		-0.000751 (-0.103)		0.00871 (1.436)	
Couple Household	0.0282* (1.646)		0.0235 (1.092)		0.0153 (0.932)							
Working Spouse	-0.0194*** (-2.726)		-0.0208** (-2.535)		-0.0159** (-2.426)		-0.0197*** (-2.718)		-0.0209** (-2.527)		-0.0166** (-2.432)	
Age of Spouse	0.00112 (0.466)		0.000766 (0.283)		-0.00125 (-0.602)		0.00109 (0.447)		0.000734 (0.269)		-0.00139 (-0.646)	
Age of Spouse Square	-0.000376*** (-2.854)		-0.000364** (-2.410)		-0.000188* (-1.669)		-0.000389*** (-2.912)		-0.000386** (-2.533)		-0.000200* (-1.734)	
Age of Head	-0.000871 (-0.795)		-0.00144 (-1.051)		-6.01e-05 (-0.0591)		-0.000757 (-0.657)		-0.00111 (-0.794)		4.24e-05 (0.0382)	
Observations	2,471	2,471	1,791	1,791	1,698	1,698	2,404	2,404	1,743	1,743	1,647	1,647
Pseudo R2	0.0975	0.0136	0.112	0.0162	0.113	0.0126	0.0966	0.0131	0.113	0.0157	0.111	0.0121

Note: Robust z-statistics in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. In specifications 1-6, the reference is the family with two children age 2-15. In specifications 7-12, the reference is the married family with two children age 2-15. The estimate of the number of additional adults in the family is insignificant across all specifications.

**TABLE 8A: MARGINAL PROBIT ESTIMATES - ALL FAMILIES AND MARRIED FAMILIES WITHOUT AND WITH CHILDREN AGE 2-15**

VARIABLES	ALL FAMILIES						MARRIED FAMILIES					
	POST REFORM SURVEY(S)						POST REFORM SURVEY(S)					
	FES 90/91 & FES96/97		FES 90/91		FES96/97		FES 90/91 & FES96/97		FES 90/91		FES96/97	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post Reform 1990/91 Dummy	-0.0230 (-1.624)	-0.0224 (-1.253)	-0.0253 (-1.500)	-0.0241 (-1.253)			-0.0240 (-1.506)	-0.0216 (-1.144)	-0.0257 (-1.363)	-0.0232 (-1.144)		
Post Reform 1996/97 Dummy	-0.0240* (-1.706)	-0.0282 (-1.501)			-0.0289* (-1.729)	-0.0301 (-1.501)	-0.0242 (-1.524)	-0.0275 (-1.377)			-0.0289 (-1.581)	-0.0289 (-1.377)
Post91*Has No child Age 2-15 Dummy	-0.0178 (-1.161)	-0.0193 (-0.783)	-0.0195 (-1.178)	-0.0204 (-0.783)			-0.0183 (-1.023)	-0.0141 (-0.512)	-0.0197 (-1.030)	-0.0149 (-0.512)		
Post91*Has One Child Age 2-15 Dummy	-0.000423 (-0.0265)	0.00949 (0.380)	0.000348 (0.0202)	0.00997 (0.380)			-0.00234 (-0.134)	0.00885 (0.336)	-0.00173 (-0.0921)	0.00929 (0.336)		
Post91*Has Three Children Age 2-15 Dummy	0.0167 (0.560)	0.0229 (0.499)	0.0170 (0.539)	0.0240 (0.499)			0.0149 (0.461)	0.0226 (0.473)	0.0153 (0.448)	0.0237 (0.473)		
Post91*Has More Than Three Children Age 2-15 Dummy	0.00287 (0.0697)	0.0645 (0.856)	0.00467 (0.105)	0.0675 (0.856)			-3.09e-05 (-0.000693)	0.0611 (0.785)	0.00167 (0.0349)	0.0638 (0.785)		
Post96 *Has No child Age 2-15 Dummy	-0.00180 (-0.0990)	0.00525 (0.187)			-0.00512 (-0.280)	0.00540 (0.187)	0.000403 (0.0189)	0.0105 (0.338)			-0.00296 (-0.141)	0.0108 (0.338)
Post96 *Has One Child Age 2-15 Dummy	-0.0172 (-1.145)	-0.0340 (-1.490)			-0.0202 (-1.313)	-0.0356 (-1.490)	-0.0229 (-1.412)	-0.0400* (-1.685)			-0.0253 (-1.555)	-0.0417* (-1.685)
Post96*Has Three Children Age 2-15 Dummy	0.0994** (2.317)	0.1000* (1.831)			0.111** (2.491)	0.102* (1.831)	0.101** (2.198)	0.104* (1.829)			0.111** (2.380)	0.105* (1.829)
Post96 *More Than Three Children Age 2-15 Dummy	-0.0310 (-1.079)	-0.0340 (-0.614)			-0.0284 (-0.890)	-0.0352 (-0.614)	-0.0364 (-1.159)	-0.0397 (-0.696)			-0.0331 (-0.983)	-0.0409 (-0.696)
Has No Children Age 2-15 Dummy	0.709*** (5.528)	0.0888*** (4.577)	0.670*** (4.159)	0.0931*** (4.577)	0.722*** (4.615)	0.0914*** (4.577)	0.774*** (5.608)	0.139*** (5.998)	0.733*** (4.240)	0.145*** (5.998)	0.782*** (4.715)	0.142*** (5.998)
Has One Children Age 2-15 Dummy	0.330*** (6.411)	0.124*** (6.854)	0.315*** (4.972)	0.129*** (6.854)	0.347*** (5.588)	0.126*** (6.854)	0.349*** (6.459)	0.138*** (7.167)	0.334*** (5.024)	0.144*** (7.166)	0.361*** (5.641)	0.140*** (7.166)
Has Three Children Age 2-15 Dummy	-0.0622*** (-4.207)	-0.0557** (-2.446)	-0.0649*** (-3.340)	-0.0590** (-2.446)	-0.0643*** (-3.896)	-0.0573** (-2.446)	-0.0707*** (-4.142)	-0.0577** (-2.378)	-0.0736*** (-3.319)	-0.0612** (-2.378)	-0.0711*** (-3.880)	-0.0590** (-2.378)
Has More than Three Children Age 2-15 Dummy	-0.0498** (-2.164)	-0.00300 (-0.0732)	-0.0513 (-1.560)	-0.00316 (-0.0732)	-0.0531** (-2.080)	-0.00309 (-0.0732)	-0.0563** (-2.122)	0.00181 (0.0410)	-0.0575 (-1.538)	0.00190 (0.0410)	-0.0582** (-2.059)	0.00185 (0.0410)
Number of Children Age 2-5	0.0810*** (3.250)		0.0779** (2.327)		0.0796** (2.553)		0.0904*** (3.281)		0.0858** (2.343)		0.0871*** (2.601)	
Number of Children Age 6-15	0.0924*** (3.768)		0.0885*** (2.687)		0.0979*** (3.185)		0.102*** (3.771)		0.0975*** (2.707)		0.106*** (3.202)	

**TABLE 8A: MARGINAL PROBIT ESTIMATES - ALL FAMILIES AND MARRIED FAMILIES WITHOUT AND WITH CHILDREN AGE 2-15**  
(continued)

VARIABLES	ALL FAMILIES						MARRIED FAMILIES					
	POST REFORM SURVEY(S)						POST REFORM SURVEY(S)					
	FES 90/91 & FES96/97		FES 90/91		FES96/97		FES 90/91 & FES96/97		FES 90/91		FES96/97	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Number of Children 2-5*No. of Children 6-15	-0.0170*** (-2.979)		-0.0184*** (-2.590)		-0.0107 (-1.549)		-0.0196*** (-3.102)		-0.0210*** (-2.697)		-0.0125* (-1.670)	
Sex Ratio Index	0.617 (1.456)		0.783 (1.255)		0.396 (0.887)		0.842* (1.767)		0.959 (1.359)		0.591 (1.198)	
Has Two Children with Same Sex	0.00854 (0.765)		0.00971 (0.713)		0.0149 (1.073)		0.00398 (0.332)		0.00328 (0.226)		0.00837 (0.583)	
Log Real Household Income	0.00702 (1.511)		0.00717 (1.237)		0.00616 (1.037)		0.00979* (1.798)		0.00946 (1.383)		0.00944 (1.389)	
Couple Household	0.0632*** (7.973)		0.0675*** (6.724)		0.0625*** (6.634)							
Working Spouse	-0.0269*** (-4.671)		-0.0294*** (-4.213)		-0.0246*** (-3.474)		-0.0312*** (-4.763)		-0.0340*** (-4.311)		-0.0280*** (-3.573)	
Age of Spouse	0.00176 (1.356)		0.00177 (1.127)		0.00142 (0.897)		0.00231 (1.596)		0.00246 (1.414)		0.00194 (1.136)	
Age of Spouse Square	-0.000624*** (-7.508)		-0.000668*** (-6.510)		-0.000648*** (-6.615)		-0.000723*** (-7.850)		-0.000772*** (-6.834)		-0.000747*** (-7.104)	
Age of Head	-0.000904 (-1.163)		-0.000518 (-0.486)		-0.00153 (-1.637)		-0.000844 (-0.923)		-0.000570 (-0.451)		-0.00138 (-1.277)	
Number of Additional Adults	0.00476 (0.730)		0.00541 (0.672)		0.0130* (1.911)		0.00641 (0.845)		0.00761 (0.821)		0.0164** (2.133)	
Observations	4,810	4,810	3,484	3,484	3,341	3,341	4,378	4,378	3,175	3,175	3,051	3,051
Pseudo R2	0.251	0.0558	0.255	0.0600	0.255	0.0543	0.245	0.0689	0.249	0.0721	0.253	0.0684

Note : Robust z-statistics in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. In specifications 1-6, the reference is the family with two children age 2-15. In specifications 7-12, the reference is the married family with two children age 2-15.

**TABLE 9A: STANDARD AND RECURSIVE BIVARIATE PROBIT ESTIMATES**

	BIRTH PROBABILITY				WORKING PROBABILITY			
	RECURSIVE		STANDARD		RECURSIVE		STANDARD	
	Marginal	z	Marginal	z	Marginal	z	Marginal	z
Working Spouse	-0.1238	-2.05						
Sex Ratio Index	1.2063	2.53	1.1169	2.38	0.4246	0.34	0.4061	0.32
Post Reform 1990/91 Dummy	-0.0370	-2.56	-0.0430	-3.15	0.0491	1.45	0.0520	1.54
Post Reform 1996/97 Dummy	-0.0359	-2.87	-0.0400	-3.72	-0.0276	-0.48	-0.0052	-0.09
Post91*Had No Child Age 2-17 Dummy	-0.0279	-2.05	-0.0214	-1.72	-0.0614	-1.29	-0.0599	-1.25
Post91*Has One Age 2-17 Dummy	-0.0032	-0.20	-0.0065	-0.48	0.0422	1.09	0.0428	1.11
Post91*Has Three Children Age 2-17 Dummy	0.0153	0.51	0.0136	0.48	0.0053	0.12	0.0064	0.15
Post91*Has More Than Three Children Age 2-17 Dummy	0.0118	0.26	0.0184	0.39	-0.0772	-0.93	-0.0756	-0.90
Post96*Had No Child Age 2-17 Dummy	0.0000	0.00	0.0007	0.03	0.0003	0.00	0.0048	0.08
Post96*Has One Age 2-17 Dummy	-0.0146	-0.85	-0.0174	-1.19	0.0654	1.37	0.0626	1.32
Post96*Has Three Children Age 2-17 Dummy	0.0919	2.08	0.0808	1.95	0.0391	0.72	0.0390	0.72
Post96*Has More Than Three Children Age 2-17 Dummy	-0.0449	-2.24	-0.0349	-1.79	-0.1796	-2.17	-0.1800	-2.16
Has No Child Age 2-17 Dummy	0.2583	6.51	0.2427	6.46	0.0367	1.02	0.0350	0.96
Has One Child Age 2-17 Dummy	0.1513	6.25	0.1463	6.49	-0.0040	-0.13	-0.0037	-0.12
Has Three Children Age 2-17 Dummy	-0.0497	-3.43	-0.0407	-3.58	-0.0906	-2.59	-0.0916	-2.62
Has More than Three Children Age 2-17 Dummy	-0.0038	-0.12	0.0074	0.23	-0.1059	-1.70	-0.1059	-1.69
Log Real Household Income	0.0154	2.55	0.0117	2.49	-0.1777	-2.04	-0.1363	-1.63
Square Log Real Household Income					0.0119	2.33	0.0095	1.93
Age of Spouse	-0.0031	-4.22	-0.0041	-4.78	0.0132	5.92	0.0132	5.88
Age of Spouse Square	-0.0008	-4.85	-0.0006	-8.91	-0.0008	-5.22	-0.0008	-5.20
No. of Additional Adults	-0.0022	-0.29	-0.0049	-0.68	0.0289	2.54	0.0283	2.54
Living in Rural Area	0.0155	1.86	0.0240	3.01	-0.1212	-5.38	-0.1255	-5.92
Working Husband	-0.0714	-1.79	-0.0817	-2.02	0.0764	1.52	0.0752	1.52
Age of Husband			0.0002	0.23	-0.0060	-2.94	-0.0062	-2.99
Age of Spouse_Rural Dummy			0.0001	0.07	0.0081	3.84	0.0085	4.29
Correlation Parameter (rho)	0.3944		-0.1802					
P-value	0.2108		0					
Number of observations	5705		5705					

*Note* : The reference is the married family with two children age 2-17.