The Supply of Birth Control Methods, Education and Fertility: Evidence from Romania [1]

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Abstract

This paper investigates the effect of the supply of birth control methods on fertility and fertility differentials across educational groups by exploring the effects of Romania's 23-year period of continued pronatalist policies. In 1966, the Romanian government declared abortion and family planning illegal and this policy was sustained until December 1989 with only minor modifications. The implementation and repeal of the restrictive regime provide a useful source of variation in the cost of birth control methods that is orthogonal to the demand for children.

Women who spent most of their reproductive years under the restrictive regime suffered large increases in fertility (about 0.5 children or a 25% increase). Uneducated women had bigger increases in fertility after policy implementation and larger fertility decreases following the lift of restrictions after 1989, when fertility differentials between educational groups decrease by almost 50%. These results suggest the significant importance that birth control methods play in understanding fertility levels and the effect of education on fertility.

1 Introduction

The contribution of the supply of birth control methods in decreasing fertility rates is a very old and important research question. Besides its intrinsic theoretical value, the answer to this question is of obvious policy interest because it is directly related to the debate on whether family planning programs have an effect on fertility. The debate tends to be polarized between those who believe that good family planning programs can work everywhere and those who contend that programs have little effect (Freedman and Freedman, 1992). Part of the reason why the issue is still controversial is because it is generally econometrically very hard to isolate the effects of family planning programs unambiguously from other possible factors that reduce fertility.

Another open research question in demography is to try to explain why educated women have fewer children. While the negative association between female education and fertility is very robust and has been established in many countries at different points in time, it is less clear what mechanism underlies this relationship. This negative association is consistent with two broad explanations, which are not mutually exclusive: (1) educated and uneducated women have a different demand for children; and (2) the supply of birth control methods affects the fertility across educational groups differently.

The link between education and fertility explained by demand factors can go through a number of channels: (1) the price of time effect from the household model (Becker,

1981); (2) a taste effect of education for fewer, better educated children; or (3) an increase in age at marriage, because women who go to school marry later. The interaction of education and the supply of birth control methods resulting in lower fertility can also be explained by a number of factors: (1) educated women might find it easier to pay for contraception, (2) they could face lower psychic costs of using a particular contraceptive methods; or (3) they are potentially more efficient at using a particular contraceptive method.

The purpose of this paper is to reexamine the two broad questions outlined above using Romania's history of restrictive access to birth control methods as a natural experiment. In the last 40 years Romania went from one of the most liberal abortion and contraceptive policies in the world in the 1960's to a very restrictive regime in the 1970's and 1980's, only to revert back to a liberal policy following the fall of communism in 1989.

Using data from the 1993 Reproductive Health Survey as well as other sources, my analysis shows that the supply of birth control methods has a large effect on fertility levels and explains a large part of the fertility differentials across educational groups. Results from Romania's 23 year period of continued pronatalist policies suggest large increases in fertility for women who spent most of their reproductive years under the restrictive regime (about 0.5 children or a 25% increase). The data shows bigger increases in fertility for less educated women after policy implementation and

larger fertility decreases when access restrictions are lifted after 1989, when fertility differentials between educational groups decrease by almost 50%.

The paper is organized as follows. Part 2 reviews the channels through which the supply of birth control methods affects fertility levels and the fertility differential by education and summarizes previous findings. The following section provides background information on the Romanian context. In part 4 and 5, I describe the data and the empirical strategy, followed in section 6 by the results. Part 7 provides robustness checks incorporating similar data from Moldova and additional information form the 1992 Romanian Census and the 1990 Hungarian Census. The last section offers conclusions.

2 Theoretical Background

2.1 Demand for children versus the supply of birth control methods

In this section, I explore the theoretical link between access to birth control methods and fertility behavior. It is useful to first consider a world with costless birth control. In such a situation, each woman demands a particular "desired fertility" level, which might be affected by factors such as the opportunity cost of the mother's time, family income, social security, the rate of infant mortality, or societal and personal tastes for children. However, if birth control is costly, a woman will adjust her repro-

ductive decision-making, which determines her "optimal fertility" level.

As the costs of birth control rise, she will likely use less of it and instead she will rely on abstinence, use alternative birth control technologies, and/or have more births. Thus, the difference between "desired" and "optimal" fertility should increase (decrease) as the cost of contraception increases (decreases).

Econometrically it has been generally hard to separate these effects mainly because finding exogenous changes in the price of contraception has been difficult (Birdsall, 1989), in part because the placement of family planning programs is usually non-random. A relatively recent survey of the effect of family planning programs on fertility (Freedman and Freedman, 1992) concludes that the extent of the independent role of family planning programs in reducing fertility is still controversial.

The relative contribution of the demand for children and the supply of birth control methods in explaining fertility levels is of importance apart from helping us understand if family planning programs can work. At the family level, unwanted fertility can negatively affect educational or career decisions of the mother (Goldin & Katz 2002, Angrist & Evans 1999). Alternatively, a child that was unwanted at birth might suffer adverse developmental effects that could in turn cause inferior socio-economic outcomes. In a companion paper to the present analysis (Pop-Eleches 2002), I use the same Romanian context to examine educational and labor market outcomes of unwanted children born in 1967 as a result of the ban on abortions introduced at the end of 1966. After

controlling for family background variables children born after the ban on abortions had significantly worse schooling and labor market outcomes and men are particularly affected by the policy change. Additionally, I provide some suggestive evidence linking unwantedness at birth to higher infant mortality and increased crime behavior later in life.

2.2 Education and Fertility

The framework of demand factors versus the supply of birth control methods can help explain the effect of education on fertility. The basic interest is to understand why educated women have fewer children.

A first reason why an educated woman would demand fewer children is the price of time effect from the household model of Becker (1981). For women who are both active in the labor market and responsible for childcare, earning a higher wage (due to higher education) increases both income and the cost of raising children. Generally it is believed that the price effect more than offsets the income effect and therefore a higher wage income implies lower levels of fertility (Birdsall, 1989). Secondly, education might alter the taste of individuals for fewer, better-educated children. For example, a person going to school might potentially be exposed to role models (such as teachers or peers) with life-styles that favor small families. Finally, women who are in school are less likely to want to have children. Schooling decisions might delay marriage and

childbearing for a number of years and this could have a negative impact on lifetime fertility outcomes.

I next turn to factors that explain why the interaction of education and the supply of birth control methods cause educated women to have lower fertility levels. One link goes directly through the financial costs of contraceptives: an educated woman has presumably more resources to afford costly birth control methods. Secondly, certain contraceptive methods might be associated with psychic costs that could be lower for educated women. As an example, the use of condoms or traditional methods, such as the calendar method or the withdrawal method, might require the cooperation of the husband. An educated woman has potentially more bargaining power within the family and thus could be more successful at using these methods if other alternatives are not available. Alternatively, an educated person may have lower psychic cost of reducing sexual activity if access to birth control methods is limited. Finally, educated women may be more efficient at using particular contraceptive methods, especially in settings where information about the proper use of a contraceptive technology is not readily available or where the only methods of birth control available have high failure rates and need to be used with extreme care, such as in the case of traditional methods. Similarly, an educated woman might have superior information processing abilities (Schultz 19XX?) and this might be crucial for the adoption of new reproductive technologies.

While the negative association between education and fertility is generally accepted to be very robust (Birdsall, 1989), it has proved difficult to distinguish between the possible mechanisms. As an example, measuring the opportunity cost of the mother's time with her wage rate is problematic because labor market decisions are clearly influenced by birth rates. Some evidence on the efficiency channel is provided by Rosenzweig and Schultz (1985), who use US data to show that educated women have higher failure rates when using contraceptive methods with large scope of misuse.

3 Background

During the period 1960-1990 unusually high levels of legally induced abortions characterized the communist countries of Eastern Europe. These countries, following the lead of the Soviet Union, were among the first in the world to liberalize access to abortions in the late 1950s (David, 1999). Compared to other countries in the region, Romania has long been a "special situation" in the field of demography and reproductive behavior, because of the radical changes in policy concerning access to legal abortion (Baban, 1999, p.191). Prior to 1966, Romania had the most liberal abortion policy in Europe and abortion was the most widely used method of contraception (World Bank, 1992). In 1965, there were four abortions for every live birth (Berelson, 1979).

Worried about the rapid decrease in fertility (see graph 1) Romania's dictator,

Nicolae Ceausescu, issued a surprise decree: abortion and family planning were declared illegal and the immediate cessation of abortions was ordered. Legal abortions were restricted to the following exceptions: women over the age of 45, women with more than four children, serious health reasons, and pregnancies resulting from rape or incest. At the same time, the import of modern contraceptives from abroad was suspended and the local production was reduced to a minimum (add reference from Gligman)

The results were dramatic: crude birth rates increased from 14.3 in 1966 to 27.4 in 1967 and the total fertility rate increased from 1.9 to 3.7 children per woman in the same period (Legge, 1985). As can be seen in Graph 1, the large number of births continued for about 3-4 years, after which the fertility rate stabilized for almost 20 years, albeit at a higher level than the average fertility rates in Hungary, Bulgaria and Russia. The law was strictly enforced until December 1989, when the communist government was overthrown. This trend reversal was immediate with a decline in the fertility rate and a sharp increase in the number of abortions. In 1990 alone, there were 1 million abortions in a country of only 22 million people (World Bank, 1992). During the 1990s Romania's fertility level displays a pattern remarkably similar to that of its neighbors.

This legislative history enables me to study how the changes in the supply of birth control methods affect the pregnancy, birth and abortion behavior of women. The main part of the analysis uses the liberalization of access to abortion and contraception in

December 1989 as a natural experiment to estimate the effect of birth control methods on reproductive outcomes. Data from neighboring Moldova, which did not experience changes in abortion and contraceptive regime in this period, is used to account for possible changes in demand for children induced by the transition process. Finally, I will assess the robustness of the findings using data from the Romanian and Hungarian census, by comparing fertility behavior of women who spent different fractions of their reproductive years under the restrictive regime.

4 Data

The primary dataset for the present analysis is the 1993 Romanian Reproductive Health Survey. Conducted with technical assistance from the Center for Disease Control, this survey is the first representative household-based survey designed to collect data on the reproductive behaviors of women of aged 15-44 after the fall of communism. For each respondent the survey covered their socioeconomic characteristics, a history of all pregnancies, their outcomes (birth, abortion, miscarriage etc.) and the planning status of the pregnancies (unwanted or not). At the same time, for the period January 1988 through June 1993, the questionnaire included a monthly calendar of contraceptives used. The monthly calendar and the pregnancy histories where combined to create a history of monthly use of contraceptives and pregnancy outcomes for

the period January 1988 to December 1992.[1]

The dataset has a number of important advantages for my purposes. First, the retrospective survey covers the reproductive outcomes of women both before and after the ban on abortions and birth control was lifted in December 1989. Secondly, since at the time of the interviews in late 1993, abortions had already been legalized for a number of years, women were a lot more likely to report their use of illegal abortions prior to 1989. In fact according to the Final Report of the Reproductive Health Survey (Serbanescu et al. 1995), the reporting of abortion levels in the survey prior to 1990 match very closely government aggregate data on official, spontaneous and estimated illegal abortions.

In order to assess the robustness of the results, the analyses will include data from three additional sources. First, data from 1997 Moldova Reproductive Health Survey will be used to control for possible demand driven changes in fertility behavior. The choice of Moldova as an appropriate comparison country is threefold. First, Moldova did not restrict access to abortion and contraception either before or after the fall of communism (Serbanescu et al. 1999). Secondly, the majority of the population in Moldova is ethnically Romanian, allowing to control for potentially important religious and cultural factors. Finally, the Moldavian survey used in 1997 was also carried

[1] Of the 4871 observations in the sample, we successfully merged the monthly contraceptive calendar with the pregnancy outcomes for 4792 of cases. The data for 1993 was not used because for most pregnancies the pregnancy outcome was uncertain at the time of the survey in the second half of 1993.

out under the technical assistance of the Center for Disease Control and its format is remarkably similar to the 1993 Romanian survey. Since the Moldavian data was collected for a sample of 5412 women aged 15-44 in 1997, fertility behavior in the period 1988 to 1992 can only be studied for the age group 15-34. Finally, the detail of information about each pregnancy outcome is less detailed than in the Romanian case and includes for each pregnancy just the outcome (birth, abortion, miscarriage etc.) Neither the planning status (unwanted or not) nor the method of contraception used is available for the period 1988 to 1992.[2]

The two additional sources used are a sample of the 1992 Romanian Census and the 1990 Hungarian Census. One of the census questions in both countries asks women about the number of children ever born and is thus a good measure of lifetime fertility for women over 40 years old. The census data will be used to check some of the findings of fertility behavior by comparing the lifetime fertility of women who spent most of their reproductive years with access to birth control methods with that of women who spent most of their reproductive years under the restrictive regime.

[2]In both surveys, detailed questions about the pregnancy outcomes, their planning status and the monthly calendar of contraceptives used are available for only the six years prior to the survey date. This explains why the 1993 Romanian data has a lot more information for the period 1988-1992 than the 1997 Moldovan data.

4.1 Regression Framework:

4.1.1 Basic Model

To investigate how the liberalization of access to abortion and contraception affects reproductive behavior, I estimate:

$$OUTCOME_{it} = \beta_0 + \beta_1 \cdot education + \beta_2 \cdot after + \beta_3 \cdot education \cdot after + \quad (1)$$
$$\beta_4 \cdot transition + \beta_5 \cdot education \cdot transition + \beta_6 \cdot agegroup_{it} +$$
$$\beta_7 \cdot agegroup_{it} \cdot after + \beta_8 \cdot agegroup_{it} \cdot transition + \varepsilon_{it}$$

$OUTCOME_{it}$ is a dummy variable taking value 1 if in a given month there occurred one of the following outcomes: pregnancy or pregnancy ending in a birth, abortion, legal abortion, or an illegal abortion. In some specifications, only unwanted outcomes will be analyzed. *Education* is a dummy measuring if an individual had more than primary school (more than 8 years of schooling). $After$ is dummy taking value 1 if an event occurred between 1991 and 1992, 0 otherwise. $Transition$ takes value 1 for the year 1990, 0 otherwise. Finally, the regressions include 5 *agegroup* dummies, with the 20-24 years dummy dropped. Only months during which a person is at risk of becoming pregnant were included in the analyses[3]. Within this framework, the overall

[3]This includes the months of pregnancy (except the first one) and the three months following a pregnancy resulting in birth.

impact of the change in abortion and contraception regime on the reproductive outcome of interest for the uneducated is captured by the coefficient β_2 and the effect on the educated is $\beta_2 + \beta_3$[4]. The difference in outcomes between uneducated and educated women prior to the reform is captured by the coefficient β_1, while the differential across educational groups after the reform is captured by $\beta_1 + \beta_3$.

4.2 Fixed Effects Model

An alternative specification is to estimate a fixed effects model:

$$\begin{aligned} OUTCOME_{it} &= \alpha_0 + \alpha_1 \cdot after + \alpha_2 \cdot education \cdot after + \alpha_3 \cdot transition \\ &\quad + \alpha_4 \cdot education \cdot transition \cdot + \alpha_5 \cdot agegroup_{it} \\ &\quad + \alpha_6 \cdot agegroup_{it} \cdot after + \alpha_7 \cdot agegroup_{it} \cdot transition + \alpha_8 \cdot \gamma_i + \varepsilon_{it} \end{aligned} \tag{2}$$

where $OUTCOME_{it}$, $education, after, transition$, and $agegroup$ are the same as in the previous section and γ_i is a person fixed effect. In this specification, α_1 gives the impact of the policy change for uneducated women, while the impact for educated women is $\alpha_1 + \alpha_2$.

[4] To be more precise refers to the impact of the policy on the age group 20-24.

5 Results

5.1 Graphical Analyses

The overall impact of the liberalization of abortions and contraception in December 1989 can be easily captured in graphs[5]. Figure 1 shows the total pregnancy rate[6] for three educational groups during the two years prior to the policy change (1988-1989) in comparison to the period 1991-1992[7]. The pattern of change in pregnancy behavior is similar across groups: women of primary, secondary and tertiary education experience large increases in their total pregnancy rate of about 1.5. Figure 2 shows the total fertility rate for the three groups. While all the groups experienced decreases in fertility after 1990, the effect is uneven across groups. For women of secondary education, the decrease in fertility is from 1.93 to 1.38 children, while for university-educated women the decrease is from 1.41 to 1.02 children. The overall impact on women with primary education is a lot larger and goes from 3.22 to 2.10 children. Since pregnancy rates increased similarly across groups after the policy change while the birth rates decreased more for the uneducated population, one expects abortions

[5] See also Serbanescu et al. (1995a) and Serbanescu et al. (1995b) for a discussion of the impact of the policy change after 1989 in Romania.

[6] The total pregnancy rate is the average total number of pregnancies that would be born per woman in her lifetime, assuming no mortality in the childbearing ages, calculated from the age distribution and age-specific fertility rates of a specified group in a given reference period (United Nations, 2002). The total fertility rate (TFR) and total abortion rate (TAR) are defined in a similar way.

[7] The year 1990 was dropped because it is a transition year where women adapt to the new policy, but it will be included in the regression framework.

to have increased more for the uneducated women. Figure 3 confirms this outcome: women with primary education had an increase in their total abortion rate of 2.86, while the increase for the more educated groups was much smaller (2.17 for secondary and 1.78 for tertiary education)[8]. Since women with secondary and tertiary education experienced similar fertility responses to the policy, for the rest of the paper they will not be analyzed separately[9].

5.2 Regression Results

Table 2A presents the first set of regression estimates for the impact of the policy change on reproductive behavior for the basic equation (1). Each column in the table reflects the effect on a particular outcome. The first three columns confirm the graphical analysis: columns 1-3 reflect the large increases in pregnancies and abortion after 1990 and the large decreases in fertility during this period. At the same time, the impact was differential across educational groups: the interaction of *education* and $after$ is large and positive for the births regression (column 2) and large and negative for the abortion regression (column 3). These results represent the two main findings of this paper: (1) the supply of birth control methods has a large impact on fertility levels

[8] These results are in line with Levine and Staiger (2002), who view abortion as an insurance mechanism that protects women from unwanted births.

[9] Another reason for merging women with secondary and tertiary into one group is due to the relatively small number of women with tertiary education (13%).

and (2) it explains a large part (almost 50% in this specification[10]) of the fertility differential between educated and uneducated women.

Columns 4 and 5 of Table 2A analyze the pregnancies ending in abortions in more detail. Column 4 presents the results for legal abortions, which prior to the reform were allowed either for medical reasons or for women older than 40 or with more than 4 children[11]. In column 5 a similar regression is presented for illegal or provoked[12] abortions. Somewhat predictably, the results confirm the large increases in legal abortions and the virtual disappearance of illegal abortions after the policy change[13]. The response in abortion behavior was immediate and they happened already in 1990, as the coefficient on the *transition* dummy indicates.

Table 2B studies pregnancy outcomes identified by the respondents as "unwanted". The results are similar to the previous table and they confirm our earlier results. In column 2, the coefficient on $after$ is negative, large and significant while the coefficient on the interaction of *education* and $after$ is positive and significant. The use of unwanted pregnancy outcomes would be better suited for the current analyses if respondents would ex post truthfully reveal the planning status of their pregnancies. A comparison of the results in Table 2A and 2B seems to imply that women tend to un-

[10] The coefficient on *education* is -0.00408 and the interaction of *education* and $after$ is 0.00195.

[11] It is likely that a large number of abortions prior to 1990 were illegal but reported as legal by the respondents. In fact, a large number of non-medical abortions reported as legal by the respondents did not occur to women over 40 or with more than 4 children.

[12] "Provoked" was the name used in the survey question.

[13] An abortion after the policy change can theoretically still be considered illegal if, for example, it is not performed in a hospital, as the new abortion law requires.

derreport unwanted births given that the coefficient on $after$ is much larger for births than for unwanted births[14]. However, the corresponding coefficients in the abortion regressions are remarkably similar in size.

An alternative way to measure the effect of the policy regime on fertility behavior is to use fixed effects regressions. Estimates of equation (2) are presented in Table 3A for overall pregnancy outcomes and Table 3B for unwanted pregnancy outcomes. The coefficients on $after$ and the interaction of *education* and $after$ are comparable in sign, size and significance to the earlier results and hence appear to confirm our previous findings.

The models used so far do not control for other measures of socio-economic status that are likely to be correlated with our education variable and could have an independent effect on the pregnancy outcomes. For example, educated women are more likely to live in higher income or urban families, which could facilitate easier access to abortion under a restrictive regime. In Table 4, I present regressions, which include a number of controls (a socio-economic index for basic household amenities as well as urban, region and religion dummies) and their respective interactions with $after$[15]. The coefficients in column 3 (for pregnancy) and column 6 (for birth) on *education*,

[14] A possible alternative explanation of the difference between these coefficients could be changes in demand for children during this period. In a later section I will check the validity of this claim using data from Moldova to control for possible demand driven explanations.

[15] There is of course the potential worry about the endogeneity of these controls since they are measured at the time of the survey and so after the pregnancy outcomes have occurred.

$after$ and the interaction of *education* and $after$ do not change significantly once we include these controls into the regression framework.

Another potential worry is the endogeneity of education, given that the birth of a child may have a negative effect on a woman's educational achievement (Katz and Goldin (2002)). Since the vast majority of Romanians finishes primary school prior to age 15 and does not have children before that age (add data from the survey), this effect is potentially very small. In order to deal with this issue, the regressions for pregnancy and births are estimated again restricting the sample to individuals aged 20 or higher. The coefficients in columns 2 and 5 of Table 4 are very similar to the earlier results.

5.3 Contraceptive Specific Pregnancy Rates and Prevalence of Contraceptive Methods

In this section, I first explore the effect of different contraceptive methods on the probability of getting pregnant both before and after the liberalization of abortions and modern contraception. The information on the types of contraceptives used is taken from the monthly calendar of birth control methods used. Each person-month pregnancy outcome observation in the dataset is linked to the contraceptive method used the previous month. I divide contraceptive methods into four categories. The first category uses traditional methods of contraception (calendar, rhythm or a combination

of the two), the second category uses modern methods (IUD, pill, condom, diaphragm etc.) and a very small proportion uses other methods (such as local spermicides). Finally a majority of women are using no method of contraception. The interpretation of the results for this group is difficult because it includes both women who do not use contraception because they want to get pregnant and women who want to avoid pregnancy but do not know (or do not want to use) any contraceptive methods. The breakdown of methods used in the sample is as follows: no method (62%), traditional (29%), modern (7%) and other (2%).

In Table 5A, I run regressions estimating the incidence of a pregnancy restricted to users of a particular method of pregnancy control. The two most interesting results are in columns 3 and 4: Educated women experienced a lot lower contraceptive failure rates when using traditional methods but this was not the case for modern contraceptives. The coefficient on *education* in the regression for women using modern methods is positive and insignificant (see column 4 of Table 5A)[16]. These results are consistent with at least two interpretations: (1) educated women are more efficient at using contraceptive methods characterized by high failure rates and little information on proper use, and (2) educated women face lower psychic costs of using a particular contraceptive method. Finally, Table 5B repeats the previous analysis using unwanted pregnancies and the results are consistent with those in Table 5A.

[16] The results in this table need to be interpreted with care. Most worrying, the choice of a particular contraception method is endogenous.

I next turn to the adoption of modern contraceptive methods since their liberalization following the fall of communism. The estimation procedure uses a regression framework similar to equation (1), but the independent variables are now dummies taking value 1 for a particular contraceptive method used (no method, traditional, modern or other). Table 6 shows that prior to the policy change, educated women were 6% less likely to use no method of birth control compared to the uneducated, and this is mainly explained by a 5% higher probability of using a modern method. The adoption of modern contraceptives after 1989 has been surprisingly slow. The proportion of uneducated women using modern contraceptives increased by only 0.7% and the similar increase for the educated group was only slightly larger (1.7%). These results broadly imply that the change in reproductive behavior in Romania after 1989 has been affected mainly by the liberalization of abortions and not by the liberalization of access to modern contraceptives[17].

6 Robustness checks

6.1 Moldovan data

The models in Part 5 do not control for possible changes in demand for children resulting from the fall of communism. This effect might be potentially important given that

[17] An interesting research question is to what extent the wide use of abortions in the Romanian society hinders the adoption of modern contraceptives.

basically all former communist countries experienced decreases in fertility, which have been attributed to adverse social and economic conditions during the transition years (David et al, 1997). As discussed earlier, I check the robustness of the main findings using similar data from Moldova, a former Soviet Republic that did allow free access to abortion and contraception throughout this period and where Romanians are the largest ethnic group.

Consider a variant of equation (1) that incorporates the Moldovan data:

$$\begin{aligned} OUTCOME_{it} &= \theta_0 + \theta_1 \cdot education + \theta_2 \cdot after + \theta_3 \cdot education \cdot after \\ &\quad + \theta_4 \cdot romania + \theta_5 \cdot romania \cdot after + \theta_6 \cdot romania \cdot education \\ &\quad + \theta_7 \cdot romania \cdot after \cdot education + \theta_8 \cdot agegroup_{it} + \theta_9 \cdot agegroup_{it} \cdot after + \varepsilon_{it} \end{aligned} \tag{3}$$

where $education, after$[18] and $agegroup$ are the same as before and $romania$ indicates that an observation is from the Romanian data. $OUTCOME_{it}$ is the number of pregnancies (or births or abortions) that occur to a particular person in a given year. In this specification the coefficients of interest (θ_5, θ_6 and θ_7) describe the responses in reproductive behavior after 1990 for different educational groups that are particular for Romania after controlling for common trends in the two countries.

[18] We use the first year (1990) of sharp decline in GDP to date the start of the transition process in both countries. The results of the analyses are not affected if Moldova's transition is defined to start in 1991, the year the country declared its independence.

The fixed-effect model for this setup is:

$$\begin{aligned} OUTCOME_{it} &= \pi_0 + \pi_1 \cdot after + \pi_2 \cdot education \cdot after + \pi_3 \cdot romania \cdot after \\ &+ \pi_4 \cdot romania \cdot after \cdot education + \pi_5 \cdot agegroup_{it} \\ &+ \pi_6 \cdot agegroup_{it} \cdot after + \pi_7 \cdot \gamma_i + \varepsilon_{it} \end{aligned} \tag{4}$$

where all the variables are the same as above, γ_i is a person fixed effect and the coefficients of interest are π_3 and π_4.

Estimates of equations (3) and (4), shown in Tables 7A and 7B, confirm the robustness of the earlier results. In the birth regression reported in column 2 of Table 7A the coefficient π_3 ($romania \cdot after$) is negative and significant indicating that the decrease in fertility was larger in Romania relative to Moldova after the fall of communism. Similarly, the coefficient π_4 ($romania \cdot after \cdot education$) is positive and significant and thus implies that the decrease in births was more pronounced for the uneducated group in Romania. The same regression using pregnancies ending in abortions (column 3 of Table 7A) are also consistent with our earlier results.

However, the estimates in Table 7A and 7B do indicate that some of the decreases in fertility after 1990 can be attributed to changes in demand for children possibly due to the negative impact of the transition process. The coefficient on $after$ is negative and large (and significant in the fixed effects specification) and they imply that Moldova

also experienced decreases in fertility during this time. However, the interaction of *education* and $after$ is negative suggesting that if anything demand driven factors would widen fertility differentials across educational groups.

6.2 Census data from Romania and Hungary

To provide a more complete picture of the fertility impact of Romania's restrictive policy towards methods of birth control, this section uses census data from Romania and Hungary to track fertility levels over time. Since the liberalization of access to abortions and modern contraceptives after 1990 resulted in large decreases in fertility and a narrowing of the fertility differential across educational groups, one would naturally expect the long term implications of the restrictive policy in 1966 to have produced the opposite effect: increases in overall birth levels and larger differentials between educated and uneducated women.

The short run fertility impact of the 1966 law has been described in detail in Pop-Eleches (2002). The period June - October of 1967 experienced fertility levels that were up to 3 times higher than the period January - May of the same year. Another interesting aspect of this policy change was that in the short run educated women, who were using abortion more frequently than uneducated women, experienced the largest increases in fertility[19]. However, as seen in our earlier analyses, the long-term effects

[19] As mentioned earlier, it is helpful to think of abortion as birth control in the Romanian context.

of the policy were particularly harmful to the less educated women.

The 1992 Romanian census asked women about the number of children ever born and thus for women who were over 40 in 1992 (or born prior to 1952) this variable is a good proxy for lifetime fertility. In Graph 2, I graph the average number of children by year of birth for women born between 1900 and 1955. For women born between 1900 and 1930 I see a gradual and significant decline in fertility, which is broadly consistent with the timing of Romania's rapid demographic transition after World War II. The fertility impact of the restrictive policy can be observed for women born after 1930. Women born around 1930 were in the their late thirties in 1967 and thus towards the end of their reproductive years at the time of the policy change. In contrast, the cohorts born around 1950 were in their late teens in 1967 and thus spent basically all their fertile years under the restrictive regime. The difference in fertility between these two cohorts is about 0.4 children and is probably a lower bound of the supply side impact since Romania's rapid economic development in this period probably decreased demand for children. Graph 2 also plots the mean number of children born to Hungarians living in Romania (from the 1992 Romanian census) and to the population in Hungary (from the 1990 Hungarian census). Hungary and the Hungarian population in Romania provide good comparison groups, since Hungary did not restrict access to birth control methods. Graph 2 shows the similar trend in fertility for Hungarians in both countries for women born prior to 1930 and the divergence in fertility levels afterwards.

Graph 3 presents evidence of increases in the fertility differential between educated and uneducated women over time. The fertility differential between educated and uneducated women experienced a gradual decline over time for cohorts born prior to 1930 followed by a gradual increase for cohorts born afterwards. The differential almost doubled when comparing cohorts born around 1930 and 1950 and is consistent with my earlier results[20].

7 Conclusion

The effect of the supply of birth control methods on fertility and its differential impact across educational groups has received wide attention from demographers and economists around the world. However, an empirical investigation of these issues requires a source of variation in the cost of birth control methods that is orthogonal to the demand for children.

In this paper I argue that the introduction (in 1967) and the repeal (in 1989) of pronatalist policies in Romania, which drastically restricted access to abortion and other contraceptives for large groups of women, provide a useful source of variation in the cost of birth control methods. Using data from a variety of sources I provide evidence that these pronatalist policies caused large increases in fertility. The data

[20] The relatively small number of uneducated Hungarians in the Romanian census sample and the inability to properly match educational levels between the Romanian and Hungarian data prevented an analysis of fertility differentials over time for the Hungarian population.

reveals larger fertility increases for less educated women after birth control restrictions larger fertility decreases when access restrictions are lifted after 1989. My findings suggest the significant importance that birth control methods play in understanding fertility levels and the effect of education on fertility.

The results imply that at least in the Romanian case where there is a lot of demand for fertility control methods, the provision of family planning programs can have large effects on fertility levels. Moreover, since the least educated seem to benefit most from such programs, distributional goals could provide an additional reason for the provision of such public goods.

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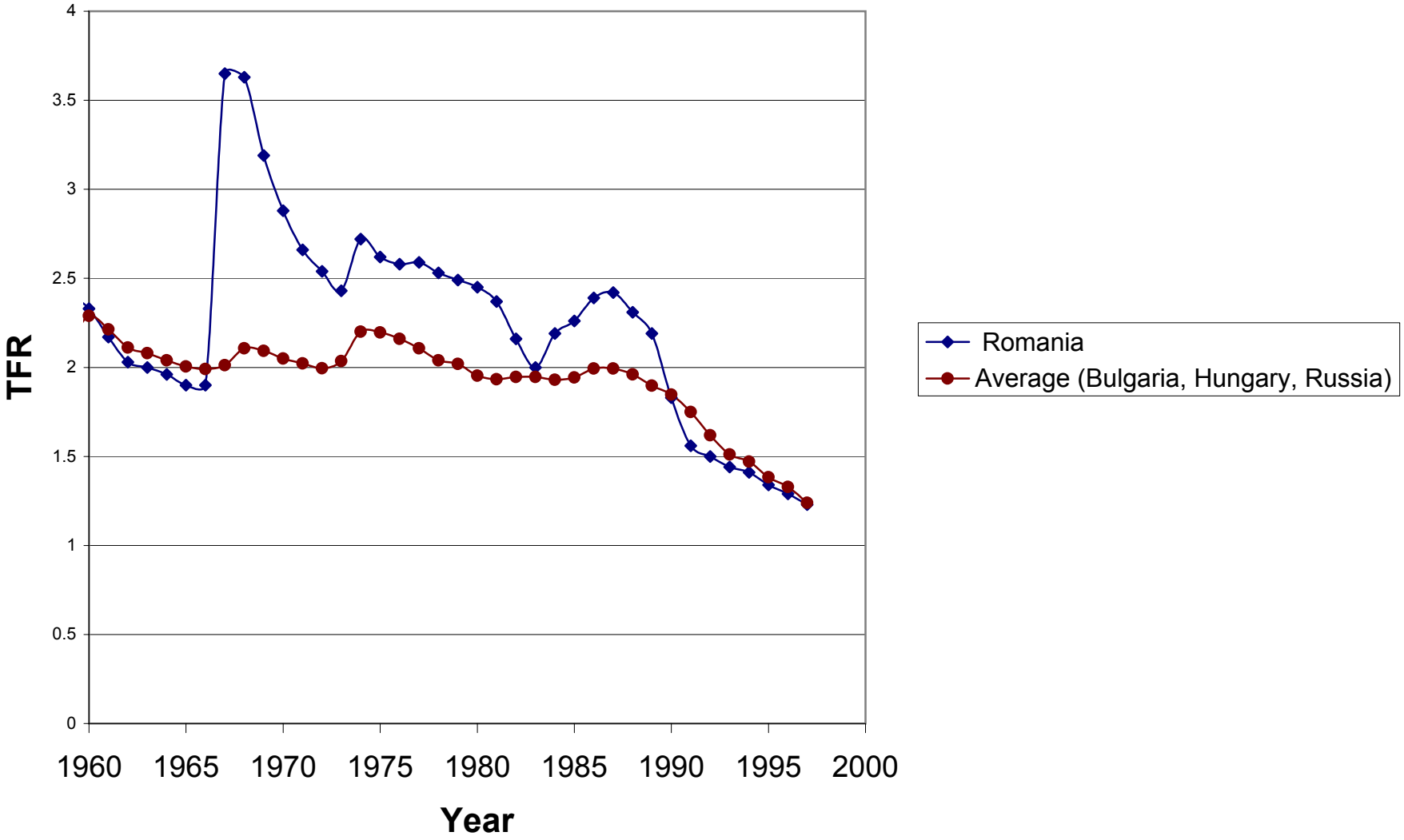
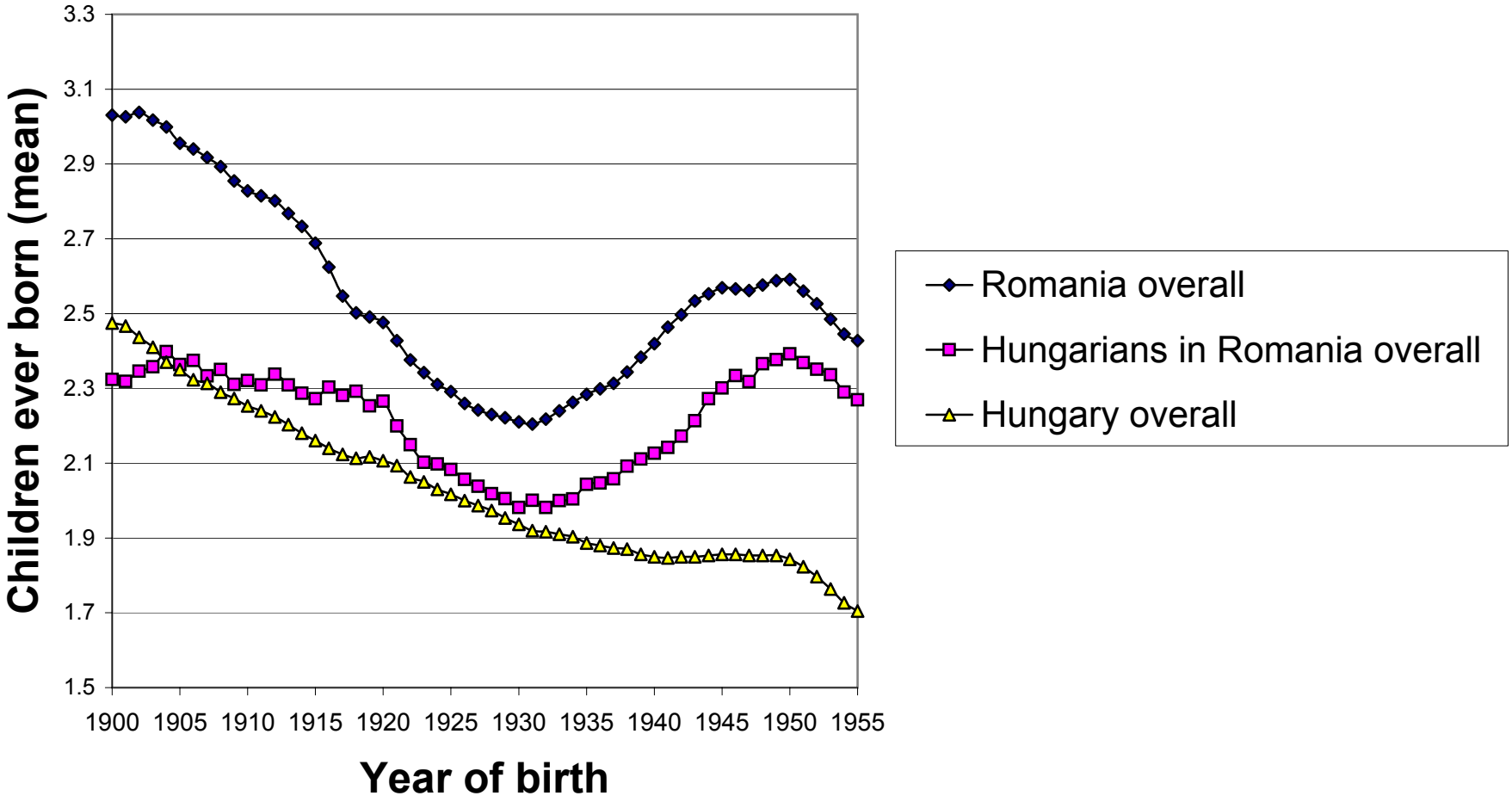
Graph 1: TOTAL FERTILITY RATES: 1960-1997



Graph 2: Fertility level of women born between 1900-1955



Graph 3: Fertility levels in Romania by education

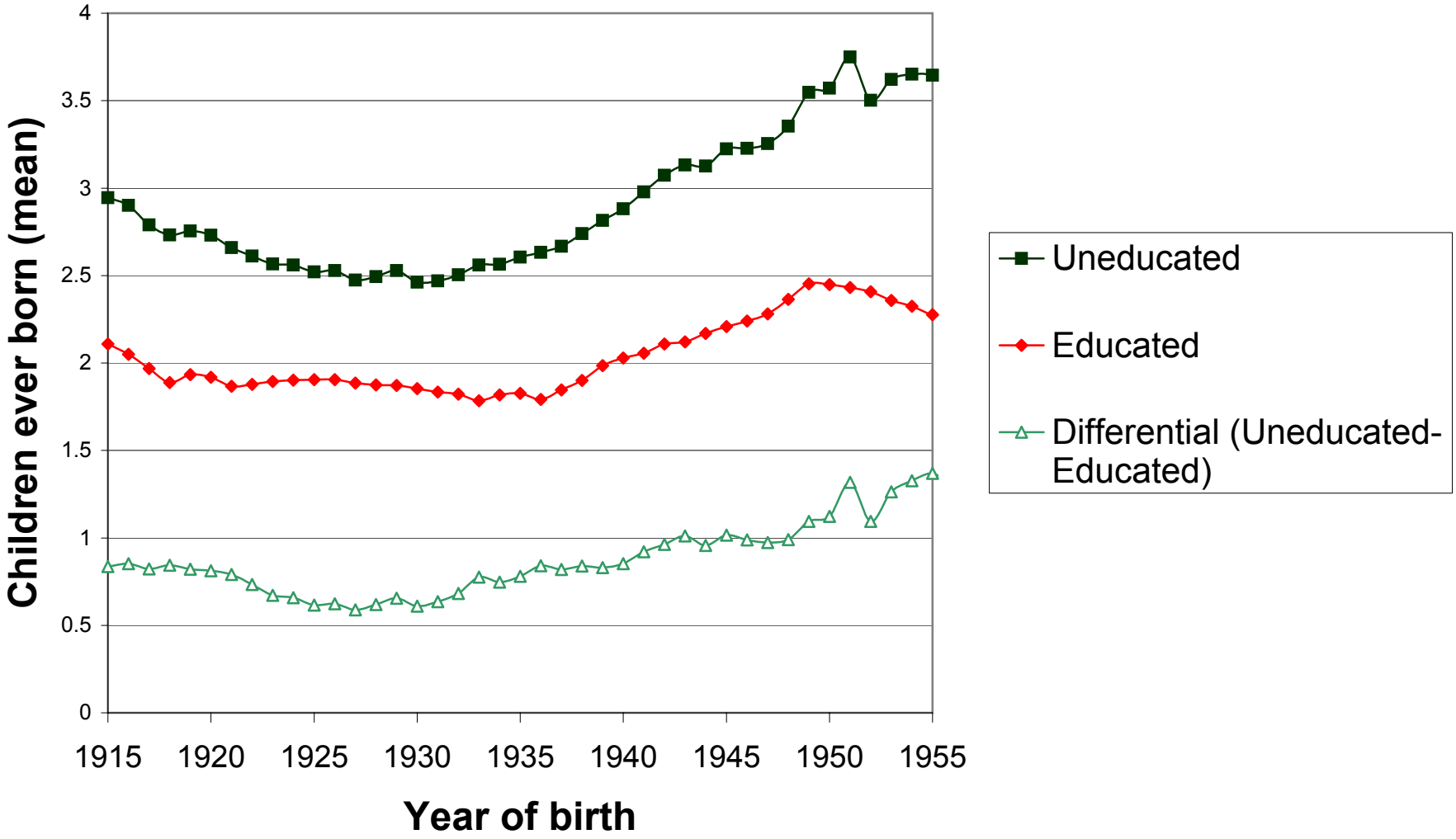


Figure 1: TOTAL PREGNANCY RATES: BEFORE (1988-1989) AND AFTER (1991-1992)

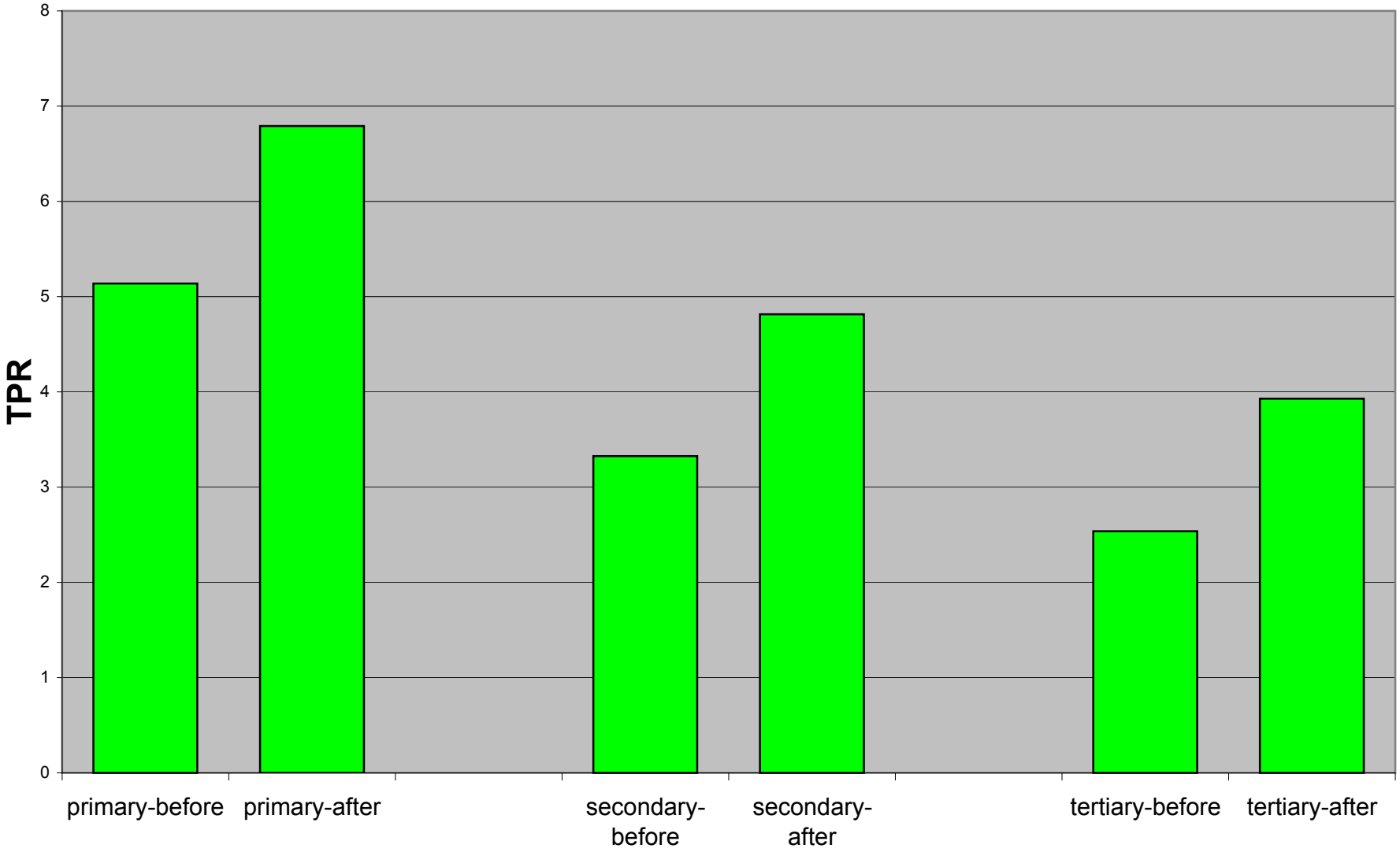


Figure 2: TOTAL FERTILITY RATES: BEFORE (1988-1989) AND AFTER (1991-1992)

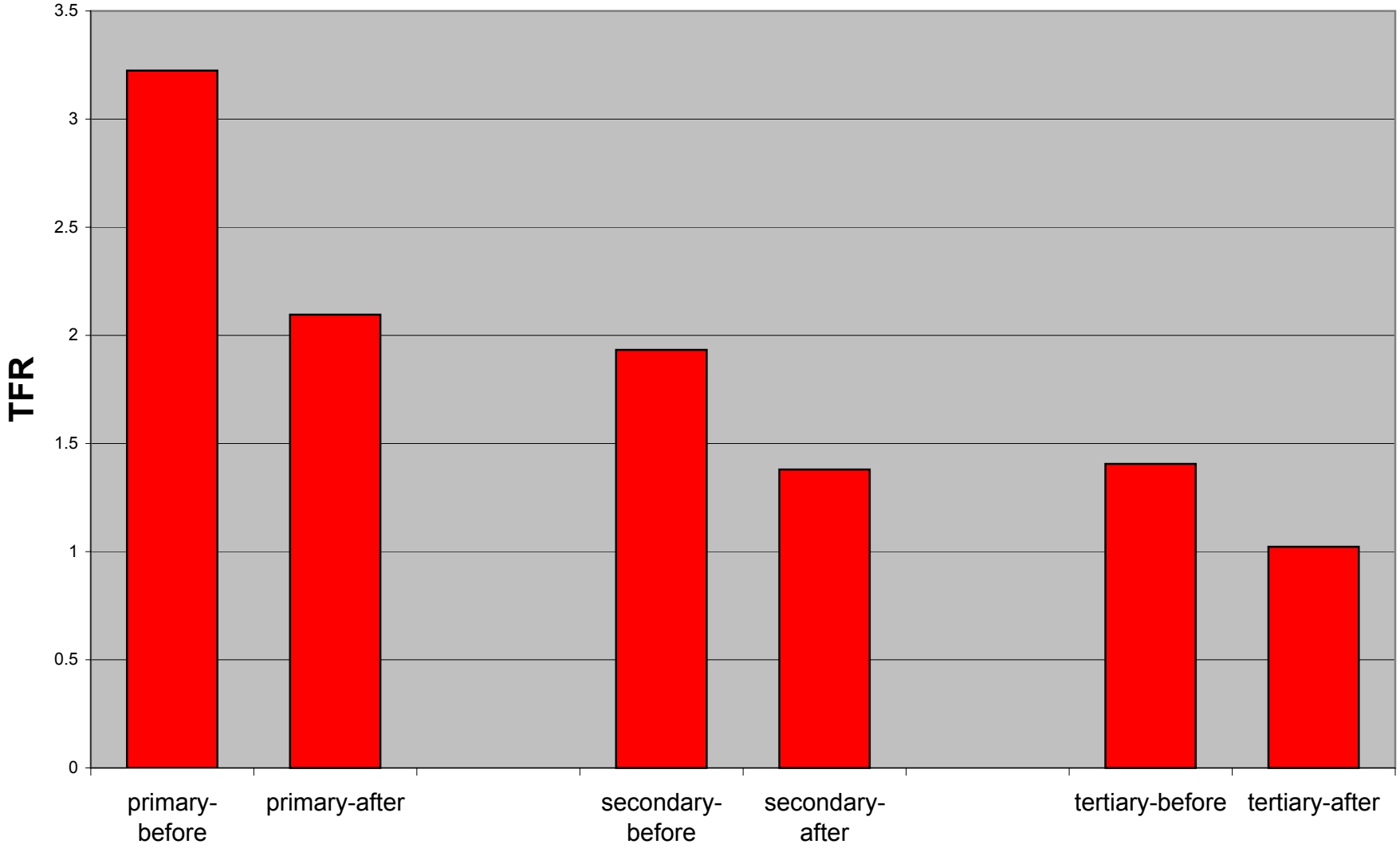


Figure 3: TOTAL ABORTION RATES: BEFORE (1988-1989) AND AFTER (1991-1992)

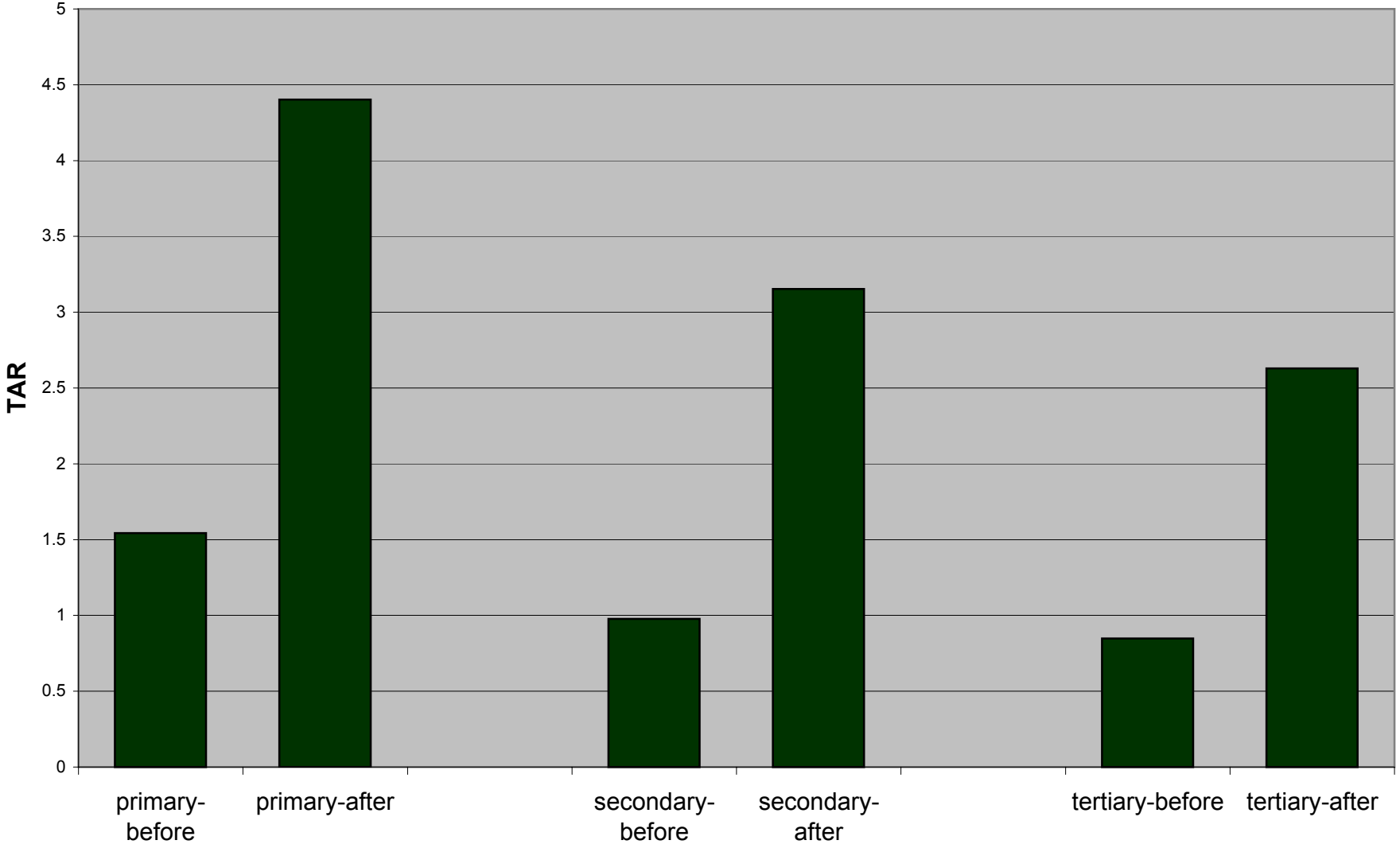


Table 1. Summary Statistics

EDUCATION:	
primary	0.24
secondary	0.63
tertiary	0.13
SOCIOECONOMIC INDEX:	
low	0.33
medium	0.54
high	0.13
% URBAN:	0.65

	BEFORE (1988-1989)	**AFTER (1991-1992)**
TOTAL PREGNANCY RATES		
all	3.64	5.16
primary	5.14	6.79
secondary	3.32	4.81
tertiary	2.54	3.93
TOTAL BIRTH RATES		
all	2.10	1.47
primary	3.22	2.10
secondary	1.93	1.38
tertiary	1.41	1.02
TOTAL ABORTION RATES		
all	1.16	3.42
primary	1.54	4.40
secondary	0.98	3.15
tertiary	0.85	2.63

Table 2A. Determinants of Pregnancy Outcomes

Dependent Variable:		*Pregnancy ending in:*			
	Pregnancy	*Birth*	*Abortion*	*Legal Abortion*	*Illegal Abortion*
Educated	**-0.00647*** **	**-0.00408*** **	**-0.00216*** **	**-0.00226*** **	**0.00010**
	(0.00117)	(0.00077)	(0.00078)	(0.00067)	(0.00040)
After	**0.00473** **	**-0.00695*** **	**0.01186*** **	**0.01446*** **	**-0.00262*** **
	(0.00228)	(0.00157)	(0.00161)	(0.00151)	(0.00057)
Educated * after	**-0.00036**	**0.00195** **	**-0.00250** **	**-0.00230** **	**-0.00018**
	(0.00150)	(0.00089)	(0.00122)	(0.00115)	(0.00040)
Transition	**0.00490***	**-0.00489** **	**0.01061*** **	**0.01289*** **	**-0.00234*** **
	(0.00272)	(0.00194)	(0.00196)	(0.00185)	(0.00073)
Educated * transition	**-0.00236**	**0.00022**	**-0.00271***	**-0.00212**	**-0.00053**
	(0.00192)	(0.00119)	(0.00151)	(0.00137)	(0.00066)
Constant	**0.02899*** **	**0.02069*** **	**0.00617*** **	**0.00334*** **	**0.00283*** **
	(0.00168)	(0.00128)	(0.00090)	(0.00071)	(0.00055)
Observations	239765	239765	239765	239765	239765
R-squared	0.005	0.004	0.004	0.05	0.002

Notes: The table presents the results of OLS regressions.The sample contains individuals age 15 or higher in the period 1988-1992 in the 1993 Romanian Reproductive Health Survey. The unit of observation is a person month. The dependent variables are dummy variables taking value 1 for a particular outcome (pregnancy or pregnancy ending in birth, abortion, legal abortion or illegal abortion). The independent variables are: (1) After dummy taking value 1 for the period 1991-1992, 0 otherwise; (2) Transition dummy taking value 1 for the year 1990, 0 otherwise (2) Education dummy taking value one if an individual had more than primary education; (3) Interaction dummies of education with after and transition dummies; (4) 6 age group dummies and their interactions with after and transition dummies. Variables are further defined in Table 1. Standard errors are shown below the coefficients in parentheses. Standard errors are clustered at the individual level. Regressions were weighted using the sampling weights. * indicates statistical significance at the 5% level, ** at 5% and *** at 1%.

Table 2B. Determinants of Unwanted Pregnancy Outcomes

Dependent Variable:	*Unwanted Pregnancy*	*Unwanted Pregnancy ending in:*			
		Birth	*Abortion*	*Legal Abortion*	*Illegal Abortion*
Educated	**-0.00330*** **	**-0.00118*** **	**-0.00215*** **	**-0.00229*** **	**0.00014**
	(0.00089)	(0.00038)	(0.00077)	(0.00066)	(0.00039)
After	**0.00860*** **	**-0.00234*** **	**0.01111*** **	**0.01362*** **	**-0.00253*** **
	(0.00182)	(0.00067)	(0.00158)	(0.00150)	(0.00054)
Educated * after	**-0.00172**	**0.00074***	**-0.00234***	**-0.00209***	**-0.00023**
	(0.00133)	(0.00040)	(0.00121)	(0.00114)	(0.00040)
Transition	**0.00742*** **	**-0.00222*** **	**0.00989*** **	**0.01196*** **	**-0.00213*** **
	(0.00204)	(0.00077)	(0.00192)	(0.00181)	(0.00071)
Educated * transition	**-0.00223**	**0.00019**	**-0.00222**	**-0.00159**	**-0.00057**
	(0.00157)	(0.00053)	(0.00148)	(0.00134)	(0.00065)
Constant	**0.01048*** **	**0.00399*** **	**0.00597*** **	**0.00336*** **	**0.00262*** **
	(0.00115)	(0.00062)	(0.00088)	(0.00070)	(0.00054)
Observations	239765	239765	239765	239765	239765
R-squared	0.004	0.001	0.004	0.005	0.002

Notes: The table presents the results of OLS regressions.The sample contains individuals age 15 or higher in the period 1988-1992 in the 1993 Romanian Reproductive Health Survey. The unit of observation is a person month. The dependent variables are dummy variables taking value 1 for a particular outcome (unwanted pregnancy or unwanted pregnancy ending in birth, abortion, legal abortion or illegal abortion). The independent variables are: (1) After dummy taking value 1 for the period 1991-1992, 0 otherwise; (2) Transition dummy taking value 1 for the year 1990, 0 otherwise (2) Education dummy taking value one if an individual had more than primary education; (3) Interaction dummies of education with after and transition dummies; (4) 6 age group dummies and their interactions with after and transition dummies. Variables are further defined in Table 1. Standard errors are shown below the coefficients in parentheses. Standard errors are clustered at the individual level. Regressions were weighted using the sampling weights. * indicates statistical significance at the 5% level, ** at 5% and *** at 1%.

Table 3A. Fixed Effects Analysis of Pregnancy Outcomes

Dependent Variable:		*Pregnancy ending in:*			
	Pregnancy	*Birth*	*Abortion*	*Legal Abortion*	*Illegal Abortion*
After	**0.00755*** **	**-0.00697*** **	**0.01402*** **	**0.01600*** **	**-0.00200*** **
	(0.00277)	(0.00203)	(0.00185)	(0.00178)	(0.00055)
Educated * after	**0.00046**	**0.00270** **	**-0.00262***	**-0.00234***	**-0.00026**
	(0.00173)	(0.00105)	(0.00135)	(0.00128)	(0.00042)
Transition	**0.00622** **	**-0.00521** **	**0.01175*** **	**0.01364*** **	**-0.00195** **
	(0.00298)	(0.00217)	(0.00210)	(0.00199)	(0.00076)
Educated * transition	**-0.00242**	**0.00037**	**-0.00285***	**-0.00219**	**-0.00059**
	(0.00214)	(0.00135)	(0.00160)	(0.00145)	(0.00070)
Constant	**0.01454*** **	**0.01245*** **	**0.00078**	**-0.00300** **	**0.00380*** **
	(0.00208)	(0.00161)	(0.00135)	(0.00126)	(0.00059)
Observations	239765	239765	239765	239765	239765
Number of Clusters	4702	4702	4702	4702	4702
R-squared	0.04	0.03	0.04	0.05	0.03

Notes: The table presents the results of fixed effect regressions.The sample contains individuals age 15 or higher in the period 1988-1992 in the 1993 Romanian Reproductive Health Survey. The unit of observation is a person month. The dependent variables are dummy variables taking value 1 for a particular outcome (pregnancy or pregnancy ending in birth, abortion, legal abortion or illegal abortion). The independent variables are: (1) After dummy taking value 1 for the period 1991-1992, 0 otherwise; (2) Transition dummy taking value 1 for the year 1990, 0 otherwise; (2) Interaction dummies of education with after and transition dummies; (4) 6 age group dummies and their interactions with after and transition dummies. Variables are further defined in Table 1. Standard errors are shown below the coefficients in parentheses. Regressions were weighted using the sampling weights. * indicates statistical significance at the 5% level, ** at 5% and *** at 1%.

Table 3B. Fixed Effects Analysis of Unwanted Pregnancy Outcomes

Dependent Variable:	*Unwanted Pregnancy*	*Unwanted Pregnancy ending in:*			
		Birth	*Abortion*	*Legal Abortion*	*Illegal Abortion*
After	**0.01072*** **	**-0.00243*** **	**0.01318*** **	**0.01504*** **	**-0.00188*** **
	(0.00211)	(0.00080)	(0.00183)	(0.00177)	(0.00054)
Educated * after	**-0.00156**	**0.00100** **	**-0.00241***	**-0.00209**	**-0.00030**
	(0.00151)	(0.00047)	(0.00134)	(0.00127)	(0.00041)
Transition	**0.00860*** **	**-0.00230*** **	**0.01102*** **	**0.01268*** **	**-0.00172** **
	(0.00222)	(0.00084)	(0.00207)	(0.00196)	(0.00075)
Educated * transition	**-0.00244**	**0.00020**	**-0.00234**	**-0.00165**	**-0.00063**
	(0.00169)	(0.00060)	(0.00158)	(0.00144)	(0.00069)
Constant	**0.00476*** **	**0.00296*** **	**0.00137**	**-0.00217***	**0.00355*** **
	(0.00150)	(0.00074)	(0.00129)	(0.00120)	(0.00059)
Observations	239765	239765	239765	239765	239765
Number of Clusters	4702	4702	4702	4702	4702
R-squared	0.04	0.03	0.04	0.05	0.03

Notes: The table presents the results of fixed effect regressions.The sample contains individuals age 15 or higher in the period 1988-1992 in the 1993 Romanian Reproductive Health Survey. The unit of observation is a person month. The dependent variables are dummy variables taking value 1 for a particular outcome (unwanted pregnancy or unwanted pregnancy ending in birth, abortion, legal abortion or illegal abortion). The independent variables are: (1) After dummy taking value 1 for the period 1991-1992, 0 otherwise; (2) Transition dummy taking value 1 for the year 1990, 0 otherwise; (2) Interaction dummies of education with after and transition dummies; (4) 6 age group dummies and their interactions with after and transition dummies. Variables are further defined in Table 1. Standard errors are shown below the coefficients in parentheses. Regressions were weighted using the sampling weights. * indicates statistical significance at the 5% level, ** at 5% and *** at 1%.

Table 4. Determinants of Pregnancy Outcomes - Robustness

Dependent Variable:	*Pregnancy*	*Pregnancy*	*Pregnancy*	*Pregnancy ending in:* *Birth*	*Birth*	*Birth*
Educated	**-0.00647*** **	**-0.00479*** **	**-0.00562*** **	**-0.00408*** **	**-0.00263*** **	**-0.00292*** **
	(0.00117)	(0.00118)	(0.00120)	(0.00077)	(0.00073)	(0.00082)
After	**0.00473** **	**0.00478** **	**0.00447***	**-0.00695*** **	**-0.00667*** **	**-0.00746*** **
	(0.00228)	(0.00231)	(0.00251)	(0.00157)	(0.00155)	(0.00165)
Educated * after	**-0.00036**	**-0.00043**	**0.00048**	**0.00195** **	**0.00162***	**0.00232** **
	(0.00150)	(0.00155)	(0.00156)	(0.00089)	(0.00084)	(0.00096)
Transition	**0.00490***	**0.00359**	**0.00900*** **	**-0.00489** **	**-0.00571*** **	**-0.00341**
	(0.00272)	(0.00277)	(0.00310)	(0.00194)	(0.00187)	(0.00209)
Educated * transitio	**-0.00236**	**-0.00093**	**-0.00283**	**0.00022**	**0.00110**	**0.00002**
	(0.00192)	(0.00196)	(0.00205)	(0.00119)	(0.00105)	(0.00126)
Constant	**0.02899*** **	**0.02751*** **	**0.02786*** **	**0.02069*** **	**0.01942*** **	**0.01764*** **
	(0.00168)	(0.00168)	(0.00180)	(0.00128)	(0.00126)	(0.00133)
Ages included	>15	>20	>15	>15	>20	>15
Controls included	NO	NO	YES	NO	NO	YES
Observations	239765	195120	239595	239765	195120	239595
R-squared	0.005	0.006	0.004	0.004	0.01	0.002

Notes: The table presents the results of OLS regressions.The sample contains individuals age 15 or higher in the period 1988-1992 in the 1993 Romanian Reproductive Health Survey. The unit of observation is a person month. The dependent variables are dummy variables taking value 1 for a particular outcome (pregnancy or pregnancy ending in birth, abortion, legal abortion or illegal abortion). The independent variables are: (1) After dummy taking value 1 for the period 1991-1992, 0 otherwise; (2) Transition dummy taking value 1 for the year 1990, 0 otherwise (2) Education dummy taking value one if an individual had more than primary education; (3) Interaction dummies of education with after and transition dummies; (4) Age group dummies and their interactions with after and transition dummies; and (7) The control variables are : two socio-economic index dummies, an urban dummy, 3 regional dummies and 2 religion dummies. Variables are further defined in Table 1. Standard errors are shown below the coefficients in parentheses. Standard errors are clustered at the individual level. Regressions were weighted using the sampling weights. * indicates statistical significance at the 5% level, ** at 5% and *** at 1%.

Table 5A. Determinants of Pregnancy Outcomes by Method Used

Dependent Variable:	*Pregnancy using contraceptive method :*				
	All Methods (incl. no method)	*No Method*	*Traditional*	*Modern*	*Other*
Educated	**-0.00647*****	**-0.00844*****	**-0.00407***	**0.00158**	**0.00532***
	(0.00117)	(0.00162)	(0.00210)	(0.00180)	(0.00315)
After	**0.00473****	**0.00210**	**0.00830***	**0.00289**	**0.01138**
	(0.00228)	(0.00288)	(0.00442)	(0.00502)	(0.01588)
Educated * after	**-0.00036**	**0.00035**	**0.00080**	**0.00040**	**-0.00802**
	(0.00150)	(0.00189)	(0.00290)	(0.00274)	(0.00607)
Transition	**0.00490***	**0.00385**	**0.00621**	**0.01147**	**0.02831**
	(0.00272)	(0.00362)	(0.00500)	(0.00902)	(0.03178)
Educated * transition	**-0.00236**	**-0.00448**	**0.00212**	**-0.00672**	**-0.00787**
	(0.00192)	(0.00276)	(0.00313)	(0.00673)	(0.00663)
Constant	**0.02899*****	**0.03188*****	**0.02715*****	**0.00803****	**0.01544**
	(0.00168)	(0.00227)	(0.00307)	(0.00374)	(0.00977)
Observations	239765	134581	78159	18653	5456
R-squared	0.01	0.01	0.01	0.004	0.007

Notes: The table presents the results of OLS regressions.The sample contains individuals age 15 or higher in the period 1988-1992 in the 1993 Romanian Reproductive Health Survey. The unit of observation is a person month. The dependent variables are dummy variables taking value 1 for a particular outcome (pregnancy or pregnancy using no contraceptive method, traditional, modern or other contraceptives). The independent variables are: (1) After dummy taking value 1 for the period 1991-1992, 0 otherwise; (2) Transition dummy taking value 1 for the year 1990, 0 otherwise (2) Education dummy taking value one if an individual had more than primary education; (3) Interaction dummies of education with after and transition dummies; (4) 6 age group dummies and their interactions with after and transition dummies. Variables are further defined in Table 1. Standard errors are shown below the coefficients in parentheses. Standard errors are clustered at the individual level. Regressions were weighted using the sampling weights. * indicates statistical significance at the 5% level, ** at 5% and *** at 1%.

Table 5B. Determinants of Unwanted Pregnancy Outcomes by Method Used

Dependent Variable:	*Unwanted pregnancy using contraceptive method :*				
	All Methods (incl. no method)	*No Method*	*Traditional*	*Modern*	*Other*
Educated	**-0.00330*** **	**-0.00393*** **	**-0.00348***	**0.00142**	**0.00517** **
	(0.00089)	(0.00108)	(0.00179)	(0.00130)	(0.00260)
After	**0.00860*** **	**0.00771*** **	**0.01017** **	**0.00020**	**0.01398**
	(0.00182)	(0.00201)	(0.00404)	(0.00407)	(0.01383)
Educated * after	**-0.00172**	**-0.00196**	**-0.00028**	**0.00039**	**-0.00351**
	(0.00133)	(0.00157)	(0.00276)	(0.00242)	(0.00447)
Transition	**0.00742*** **	**0.00747*** **	**0.00735***	**0.01103**	**0.01700**
	(0.00204)	(0.00248)	(0.00423)	(0.00823)	(0.01743)
Educated * transition	**-0.00223**	**-0.00366***	**0.00131**	**-0.00757**	**-0.00731**
	(0.00157)	(0.00204)	(0.00285)	(0.00659)	(0.00502)
Constant	**0.01048*** **	**0.00848*** **	**0.01630*** **	**0.00508***	**0.00941**
	(0.00115)	(0.00129)	(0.00256)	(0.00276)	(0.00743)
Observations	239765	134581	78159	18653	5456
R-squared	0.003	0.005	0.003	0.003	0.005

Notes: The table presents the results of OLS regressions.The sample contains individuals age 15 or higher in the period 1988-1992 in the 1993 Romanian Reproductive Health Survey. The unit of observation is a person month. The dependent variables are dummy variables taking value 1 for a particulat outcome (unwanted pregnancy or unwanted pregnancy using no contraceptive method, traditional, modern or other contraceptives). The independent variables are: (1) After dummy taking value 1 for the period 1991-1992, 0 otherwise; (2) Transition dummy taking value 1 for the year 1990, 0 otherwise (2) Education dummy taking value one if an individual had more than primary education; (3) Interaction dummies of education with after and transition dummies; (4) 6 age group dummies and their interactions with after and transition dummies. Variables are further defined in Table 1. Standard errors are shown below the coefficients in parentheses. Standard errors are clustered at the individual level. Regressions were weighted using the sampling weights. * indicates statistical significance at the 5% level, ** at 5% and *** at 1%.

Table 6. Determinants of Contraceptive Methods

Dependent Variable:	*Contraceptive method used :*			
	No Method	*Traditional*	*Modern*	*Other*
Educated	**-0.06426*** **	**0.01313**	**0.04987*** **	**0.00196**
	(0.02019)	(0.01973)	(0.00938)	(0.00754)
After	**-0.02132**	**0.01260**	**0.00691**	**0.00183**
	(0.02132)	(0.02036)	(0.01044)	(0.00587)
Educated * after	**-0.00495**	**-0.00426**	**0.01008**	**-0.00091**
	(0.01158)	(0.01162)	(0.00744)	(0.00424)
Transition	**0.01854**	**-0.00733**	**-0.00981**	**-0.00139**
	(0.01686)	(0.01628)	(0.00802)	(0.00424)
Educated * transition	**-0.00617**	**-0.00178**	**0.01019** **	**-0.00227**
	(0.00862)	(0.00854)	(0.00514)	(0.00292)
Constant	**0.69771*** **	**0.28676*** **	**0.00647**	**0.00845**
	(0.02373)	(0.02288)	(0.01014)	(0.00794)
Observations	236946	236946	236946	236946
R-squared	0.20	0.12	0.04	0.01

Notes: The table presents the results of OLS regressions.The sample contains individuals age 15 or higher in the period 1988-1992 in the 1993 Romanian Reproductive Health Survey. The unit of observation is a person month. The dependent variables are dummy variables taking value 1 for a particular contraceptive method used: no method, traditional, modern or other. The independent variables are: (1) After dummy taking value 1 for the period 1991-1992, 0 otherwise; (2) Transition dummy taking value 1 for the year 1990, 0 otherwise (2) Education dummy taking value one if an individual had more than primary education; (3) Interaction dummies of education with after and transition dummies; (4) 6 age group dummies and their interactions with after and transition dummies. Variables are further defined in Table 1. Standard errors are shown below the coefficients in parentheses. Standard errors are clustered at the individual level. Regressions were weighted using the sampling weights. * indicates statistical significance at the 5% level, ** at 5% and *** at 1%.

Table 7A. Determinants of Pregnancy Outcomes

Dependent Variable:		*Pregnancy ending in:*	
	Pregnancy	*Birth*	*Abortion*
Educated	**-0.00737**	**-0.01703**	**0.00757**
	(0.01868)	(0.01464)	(0.01071)
After	**0.01647**	**-0.02830**	**0.03751****
	(0.02617)	(0.01936)	(0.01522)
Educated * after	**-0.03719**	**-0.01362**	**-0.02326***
	(0.02432)	(0.01864)	(0.01290)
Romania	**0.02284**	**0.01969**	**0.00803**
	(0.02302)	(0.01743)	(0.01396)
Romania * after	**0.09491*****	**-0.03949***	**0.14193*****
	(0.03221)	(0.02232)	(0.02309)
Romania * educated	**-0.08341*****	**-0.04797*****	**-0.02894****
	(0.02423)	(0.01831)	(0.01463)
Romania * after * educated	**0.01169**	**0.03932***	**-0.02509**
	(0.03402)	(0.02360)	(0.02437)
Constant	**0.25474*****	**0.15386*****	**0.06874*****
	(0.01925)	(0.01510)	(0.01112)
Observations	28990	28990	28990
R-squared	0.04	0.03	0.04

Notes: The table presents the results of OLS regressions.The sample contains individuals age 15-34 in the period 1988-1992 in the 1993 Romanian Reproductive Health Survey and the 1997 Moldova Reproductive Health Survey. The unit of observation is a person year. The dependent variables are variables indicating the number of a particular outcome in a given year (pregnancy or pregnancy ending in birth or abortion). The independent variables are: (1) After dummy taking value 1 for the period 1991-1992, 0 otherwise; (2) Romania dummy taking value 1 for an individual living in Romania, 0 otherwise (2) Education dummy taking value one if an individual had more than primary education; (3) Interaction dummies of education with after and romania dummies; (4) Interaction dummies of after with the Romania dummy; (5) Interaction dummy of education, Romania and after dummies; (6) 6 age group dummies and their interactions with after and transition dummies. Variables are further defined in Table 1. Standard errors are shown below the coefficients in parentheses. Standard errors are clustered at the individual level. Regressions were weighted using the sampling weights. * indicates statistical significance at the 5% level, ** at 5% and *** at 1%.

Table 7B. Fixed Effects Analysis of Pregnancy Outcomes

Dependent Variable:		*Pregnancy ending in:*	
	Pregnancy	*Birth*	*Abortion*
After	**-0.05381**	**-0.05835****	**0.00899**
	(0.03706)	(0.02758)	(0.02182)
Educated * after	**-0.02896**	**-0.01683**	**-0.01578**
	(0.03284)	(0.02509)	(0.01795)
Romania * after	**0.12097*****	**-0.06740****	**0.18601*****
	(0.04368)	(0.03071)	(0.03232)
Romania * after * educated	**-0.00889**	**0.06419****	**-0.05686***
	(0.04599)	(0.03236)	(0.03400)
Constant	**0.20042*****	**0.13076*****	**0.04058*****
	(0.01723)	(0.01308)	(0.01193)
Observations	28990	28990	28990
R-squared	0.38	0.28	0.40

Notes: The table presents the results of fixed effects regressions.The sample contains individuals age 15-34 in the period 1988-1992 in the 1993 Romanian Reproductive Health Survey and the 1997 Moldova Reproductive Health Survey. The unit of observation is a person year. The dependent variables are variables indicating the number of a particular outcome in a given year (pregnancy or pregnancy ending in birth or abortion). The independent variables are: (1) After dummy taking value 1 for the period 1991-1992, 0 otherwise; (2) Interaction dummies of after with education and romania dummies; (3) Interaction dummy of education, Romania and after dummies; (4) 6 age group dummies and their interactions with after. Variables are further defined in Table 1. Standard errors are shown below the coefficients in parentheses. Standard errors are clustered at the individual level. Regressions were weighted using the sampling weights. * indicates statistical significance at the 5% level, ** at 5% and *** at 1%.