Abortion Policies and Children’s Outcomes: Evidence from Eastern Europe

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Abstract

In debates on abortion, individuals often align themselves with the pro-life or the pro-choice position, citing moral and philosophical arguments. While both sides raise valid and important points in defense of their views, it would also be beneficial to consider arguments based in the economics of fertility. My thesis studies the variation in abortion policies across eight Eastern European countries over the period of 1985 to 1995 to examine whether children born when access to abortion was heavily restricted have different outcomes than children whose parents had access to abortion at the time of conception. I also compare the outcome of the marginal child, who is not born when abortion is legal, but would be born if abortion were banned, to the outcome of the average child in its cohort (the child who would be born in either policy environment). Implementing a quasi-experimental empirical approach, I find that a child born in a year when abortion was legal only to save a mother’s life is 1.6 percent more likely to graduate from primary school compared to a child born when abortion was available on request. Further, the marginal child is 14 percent more likely to graduate from primary school than the average child in its cohort. These results are consistent with a situation where even when abortion is available on request in a country, it remains accessible only to women of a more educated or affluent background. When abortion is banned, only these women have more children. Due to the new inflow of children from higher socio-economic backgrounds, on average, this cohort will graduate from primary school at higher rates. These findings contribute to existing evidence from Eastern Europe of the effect of abortion policy changes on the educational outcomes of children, as I rely on several abortion policy shifts in multiple countries. Thus, my thesis provides an interesting perspective on international abortion policy debates.
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1 Introduction

Abortion is one of the most heavily discussed topics in politics, and yet discussions on the topic are rarely about policy. Debates usually revolve around moral and philosophical arguments, which produce the two well-known positions: pro-life and pro-choice. To generalize, pro-life proponents view the fetus as a human being from the moment of conception; they oppose abortion because to them it constitutes taking a life. At the other end of the spectrum, pro-choice advocates believe that the decision to abort lies with the pregnant woman, since she has a right to control what happens to her own body.

While both sides raise valid and important points in defense of their positions, it would also be beneficial to consider arguments based in the economics of fertility. Broadly, this subfield of economics studies the trade-offs faced by pregnant women when deciding whether to continue or terminate their pregnancies, how families choose how many children to have, given their limited household resources, and whether women adapt their behavior to changes in fertility policies, such as increased contraceptive availability.

In my thesis, I focus on answering two specific questions: whether changes in a country’s abortion policies affect its birth rates, and whether children born when access to abortion was heavily restricted have different educational outcomes than children whose parents had access to abortion at the time of conception. To support my conclusions, I also compare the outcome of the marginal child, who is not born when abortion is legal, but would be born if abortion were banned, to the outcome of the average child in its cohort (the child who would be born in either policy environment).

Previous theoretical and empirical studies suggest that women rely on abortion to delay giving birth to a child they are not prepared to have (see Section 3). Under this assumption, legalizing the procedure leads to a decrease in birth rates. However, some economists argue that if abortion were already available to most women, liberalizing it further may not affect the birth rates. In this scenario, the improved abortion availability allows women to use contraception less intensively and still avoid an unwanted pregnancy; as a result all additional abortions result from pregnancies that would not have occurred under the more stringent policy. As the birth rate could be generally
thought of as equal to the abortion rate subtracted from the pregnancy rate (ignoring miscarriages),
increasing these last two measures by the same amount will not have an effect on the bottom line.

If a policy change does not affect birth rates, then the new abortion policy would not have an
impact on the outcomes of children born after it was implemented. However, if legalizing abortion
leads to a decrease in the birth rate, the effect on the outcomes of children will depend on the
interaction of a cohort-size effect and a selection effect.

The cohort-size effect refers to the inverse relationship between the size of a birth-year cohort
and its educational outcomes years later. For example, suppose that abortion legalization results
in parents having fewer children. Then, parents will be able to dedicate more financial resources
to each of their children. Moreover, the class size in public schools will decrease, which could
allow teachers to spend more time with each student individually and, thus, lead to improved
educational outcomes for that cohort.\footnote{Chetty et al. (2011) document that students assigned to smaller classes in kindergarten or primary school are significantly more likely to attend college than students assigned to a class of a greater size.} Analogously, if restricting abortion increases the size of a
cohort, then one could expect that the greater family size and school over-crowding will result in
worse educational outcomes on average.

The sign of the selection effect is more ambiguous, and depends on whether abortion is widely
accessible to women of different demographic groups. For example, imagine a country where abor-
tion is legal, but it is unavailable to the majority of women. Only a small fraction of the female
population, usually of a more educated or affluent background, can delay child-bearing.\footnote{Note that this situation is not entirely implausible especially in Eastern Europe. An abortion in Romania nowadays can reach 900RON, or around $237 ("Servicii Medicale"). At the same time the monthly household income per capita was estimated to be about $274 ("Romania Annual Household Income..."). Hence, an abortion procedure could very well impose a considerable financial burden on most women.} When
abortion is formally restricted, only these women have more children. Then, due to the new inflow
of children from higher socio-economic backgrounds, on average, this cohort will graduate at higher
rates and with better educational outcomes. The marginal child, who is born under this scenario,
is better off than the average child. Tracing back the steps, this hypothesis regarding selection
predicts that upon legalization of abortion, fewer children are born to better-educated women.
Hence, on average, children have worse educational outcomes after abortion is legalized since there
is a higher probability that they are born to a less-educated mother. The marginal child, who in
this case is not born, would again have higher educational outcomes than the average child. This is called negative selection.

Suppose now that, in the status quo, abortion is accessible to women from most demographic groups; then, restricting access to it results in all women having children whose births they would have preferred to delay. These children are raised in less-welcoming environments, and graduate from school at lower rates and with worse educational outcomes. The marginal child, who is born after the change, performs worse than the average child. If the policy shifts in the other direction, upon legalization of abortion, all women will gain access to the procedure. Children of all backgrounds graduate from school at higher rates. The marginal child, who in this case is not born, would have been worse off than the average child. This is called positive selection.

Note that positive selection and the cohort-size effect described above act in the same direction. Thus, if I find evidence of worse educational outcomes upon the restriction of abortion, I would not be able to determine which of the two effects is greater. If, however, my results show that banning abortion improves educational outcomes, then the negative selection effect must be the dominant driver of children’s outcomes.

I seek to contribute to the ongoing discussion of abortion and its effects on children outcomes by analyzing selection in the context of abortion policy changes that occurred in Eastern European states. In the late 1980s, all countries in the region started going through political and economic upheaval, moving from command to market economies and breaking with socialism. Less known is the fact that some of these countries also experienced shifts in their abortion policies. In 1990, the new transitional government of Romania repealed a twenty-year ban on abortion. The same year Poland, which had previously allowed for abortions in a variety of cases, especially if a woman claimed she had difficult living conditions, started severely restricting access to the procedure through a process which culminated in an official abortion ban in 1993. The rest of the countries in the former Soviet Union and Eastern Europe had liberal abortion policies that were mostly unchanged during this period.

The variation in policies across time and countries allows me to estimate their impact on the outcomes of children using a difference-in-differences strategy (also referred to as a quasi-
experimental approach). This empirical framework attempts to replicate controlled experiments (for example, drug trials), where subjects are randomly assigned to receive treatment or not. In a “quasi-experiment,” something like randomization comes about through an exogenous change in the environment that some individuals face (a “quasi-treatment group”) and others do not. In this case, the “quasi-treatment” group consists of countries that changed their abortion policies, and the “quasi-control” group features countries that did not experience an abortion policy shift. As the first step in that analysis, I determine the difference in children’s outcomes between the control group and the “treated” countries prior to any policy changes. Then, I look at the difference in outcomes across the same sets of countries after a new policy has been introduced. If the differences from before and after the change are the same, then I can claim that the policy has had no effect on the outcomes of interest. If, however, there is a change in the differences, then this method allows me to argue that it is due to the only factor varying across time and countries, namely the abortion policy.

To formally compare the outcomes of the marginal child and the average child in its cohort I rely on an instrumental variable strategy proposed by Gruber et al. (1999). They show that regressing the average outcomes on the log of the birth rate, which is instrumented with the variation in abortion policies across time and countries, estimates the difference in outcomes between the marginal and the average child.

In my analysis, I will use aggregated individual microdata from the most recent censuses in the following countries: Armenia, Belarus, the Czech Republic, Hungary, the Kyrgyz Republic, Poland, Romania and the Russian Federation. These data let me observe the educational outcomes in 2009-2011 for cohorts of children by country of birth and year of birth. I am focusing on children born between 1985 and 1995, which is the period just before and after the abortion policy changes took place. Specifically, the outcomes of interest are primary school completion rates and lower secondary school completion rates.

I find that imposing an abortion ban increases the birth rate by approximately 12 percent, but I am unable to conclude that introducing more moderate abortion restrictions affects the birth rate. My analysis further shows the presence of negative abortion selection in primary school completion.
rates when abortion access is severely restricted; a child born in a year when abortion was legal only to save a mother’s life is 1.6 percent more likely to graduate from primary school compared to a child born when abortion was available on request. The marginal child is about 14 percent more likely to graduate from primary school than the average child in its cohort. I do not find evidence of selection on lower secondary education completion rates or when abortion is only moderately restricted.

My thesis enriches the current literature on abortion selection in Eastern Europe, and has implications for future policy-making decisions in the region. First, due to data availability and academic interest, most of the literature on changes in abortion policy has focused largely on the United States and the Roe v. Wade decision. My thesis examines whether the theoretical frameworks and empirical studies used to analyze the U.S. extend to countries in Eastern Europe. Second, policymakers often mistakenly perceive abortion policy as a long-term solution to problems with population growth and fertility rates. As Eastern European countries are once again experiencing some of the lowest fertility rates around the world (see Section 2.3.2), it would be useful to have a region-specific discussion on the demographic effects of such policies.

The paper is organized as follows: Section 2 provides an overview of the history of abortion policies in the countries of interest and of the current trends in fertility, abortion rates and use of contraceptives in Eastern Europe; Section 3 reviews the previous literature on abortion and selection; Section 4 and 5 describe the data and the empirical framework, and Section 6 goes over the results.

2 Institutional Details

2.1 Abortion Policy Categories and Overview

While each country’s abortion policy is nuanced, there are three broad abortion policy categories: available on request, available for medical or social reasons, and available only to save a mother’s life, as categorized by Levine (2007). The first category represents the abortion policies currently in place in the United States and Sweden, for example, where a pregnant woman has a
right to an abortion at least in the first trimester, as long as she can find a medical practitioner willing to perform it. In countries such as Japan and the United Kingdom, where abortion is available for medical or social reasons, access to abortion is slightly restricted; a woman might have to justify why she wants an abortion before a committee, or she may have to provide evidence that giving birth to the child would constitute a personal or economic hardship. In general, despite these hurdles, virtually all women who apply to get an abortion in such a policy environment are allowed access to the procedure. The final policy category is the closest to a complete abortion ban; abortion is permitted only when it threatens the life or physical health of the mother. Such is the policy in the Republic of Ireland, for example.

Table 1 provides an overview of the policy changes that took place in the eight countries I am studying over the period of 1985 to 1995. Four countries changed their abortion policies. The Czech Republic and Hungary moved from medical/social to on request in 1987 and 1993, respectively. Romania lifted its abortion ban and made abortion available on request in 1990. Poland was the only country that restricted abortion access, formally banning abortion in 1993. More detailed overviews of the history of abortion in these countries are presented below.

2.2 History of Abortion Policy

2.2.1 United States

Since much of the literature on abortion selection is based on abortion policy changes in the United States, I review its history of abortion as well. Up until the late 1800s, abortions in the United States were illegal only after “quickening” (the first time that the pregnant woman could feel the fetus moving), and as such they were widely accessible and often practiced. However, public health concerns led to the criminalization of abortion except in very specific circumstances, such as saving the pregnant woman’s life (Levine, 2007). This status remained mainly unchanged until the 1960s, when discussions about availability of contraception and abortion led to important state-level and Supreme Court rulings.

The most influential state-level changes occurred in California in late 1969, and in four other states (New York, Washington, Hawaii and Alaska) in 1970. In California the State Supreme
Court de facto legalized abortion by deeming a pre-1967 anti-abortion law unconstitutional; this decision led to a substantial increase in the frequency of abortions. In 1970, the four other states repealed their abortion bans by legislation. Perhaps the most important site of these changes was the state of New York, which provided women living in the densely-populated East Coast the opportunity to travel there to abort a pregnancy. No other state legalized abortion prior to the Roe v. Wade (1973) ruling, in which the U.S. Supreme court ruled that a state could not intervene in the abortion decision during the first trimester of the pregnancy, and that interventions during the second trimester would only be allowed if there were threats to a woman’s health. Lastly, after viability of the fetus had occurred, a state would be allowed to permit abortions only when the mother’s life was in danger (Levine, 2007). As will be discussed in Section 3, many of the empirical studies on selection in the United States implement difference-in-differences strategies, in which they compare outcomes of children born in one of the five early repeal states before and after the Roe v. Wade decision, to those of children from the same birth-year cohorts, but born in other states.

Since then, some states have enacted additional restrictions on abortion availability. For example, 32 states and the District of Columbia prohibit the use of state funds for abortion except in the cases when federal funds are available (when the woman’s life is in danger, or the pregnancy was the result of incest or rape). Other restrictions mandate that women should seek counseling before performing an abortion, require that a woman seeking abortion wait a certain period of time, or necessitate some type of parental involvement in a minor’s decision to seek abortion (Guttmacher Institute, 2018).

2.2.2 Romania

Romania experienced the most dramatic shifts in abortion policy legislation among all countries in Eastern Europe. Following the legalization of abortion in 1957, there was a steep increase in total abortion rates (measured as the number of abortions per woman during her lifetime, calculated as the sum of age-specific abortion rates for each age); Frejka (1983) recorded that, on average, a woman would have 7 abortions over her lifetime. In 1966, concerned with the low rate of population
growth, the Romanian government restricted access to contraception, increased allowances for families and made abortion legal only in the most extreme cases: when the pregnancy resulted from rape or incest; when it posed a danger to the life of the mother; when one of the parents suffered from a serious hereditary disease; and when the pregnant woman suffered from a physical, mental or sensory disorder, was over the age of 45 or had given birth to at least four children. This abortion ban remained mostly unchanged in the following two decades. On December 26, 1989, after the fall of the Romanian Communist government, the new transitional government repealed abortion restrictions in an attempt to improve women’s reproductive health. Beginning January 1, 1990, women had access to abortion upon request, even though official legislation permitting abortion in the first fourteen weeks of pregnancy was not passed for another six years (United Nations, 2001).

### 2.2.3 Poland

Poland is the only country in Eastern Europe that gradually moved towards a tightening of its abortion policies. In 1956, Poland passed abortion legislation, which allowed access to the procedure on medical grounds, if the pregnancy was the result of a rape, or if the pregnant woman inhabited “difficult living conditions.” In practice, most abortions were performed on the ground of the “difficult living conditions” reason, which left the decision to the pregnant woman, as long as she could find a physician willing to perform the procedure. On April 30, 1990, the first non-Communist Polish government since World War II imposed severe restrictions on how women could get access to abortion on the basis of “difficult living conditions” – a woman had to seek approval from two gynecologists and a general practitioner, as well as obtain counseling and pay a fee (United Nations, 2001). Even though this was not an outright ban on abortion, Levine (2007) reports that birth rates increased in 1990 and spiked in 1991 as a result of the decision. On February 15, 1993, following almost nine months of public discourse, the Parliament passed Poland’s current abortion law, which restricts abortions only to cases when the woman’s life is in danger, if the pregnancy was the result of rape or incest, and in cases of fetal damage (Nowicka, 1994).
2.2.4 Other Eastern European Countries

Armenia, Belarus, the Kyrgyz Republic, and the Russian Federation were all republics within the former Soviet Union, and followed the same trend of a continual liberalization. In 1955, the government of the USSR repealed the Soviet Decree of June 27, 1936, which had prohibited the performance of abortions except in the case of a danger to life, a serious threat to health, or the existence of a serious disease that could be inherited from the parents. It ruled that abortions could be performed freely in the first twelve weeks of pregnancy, and throughout the rest of the pregnancy only if the woman’s life was in danger (interpreted to include fetal defects). Despite the legalization of abortion, high rates of illegal abortions still persisted. This led to the issuance of two additional decrees in 1982 and 1987, which allowed abortions until the 28th week for non-medical reasons, such as multiparity (when a woman already had more than five children), divorce during pregnancy or pregnancy following rape. Since 1987, abortion could be performed on any other grounds with the approval of a commission. Following the break-up of the Soviet Union, out of these countries only the Russian Federation introduced additional provisions, extending the grounds for abortion in the first twenty-eight weeks of pregnancy. Currently, abortion continues to be available on request during the first twelve weeks of gestation, and within twenty-eight weeks if authorized by a commission of physicians in all four countries (United Nations, 2001).

The Czech Republic (formerly part of Czechoslovakia until January 1, 1993) also witnessed a general trend towards liberalization of abortion since the 1950s. By December 19, 1957, abortions were allowed for medical or “other important reasons” after an approval by a commission. The following series of laws sought to define what could constitute “other important reasons.” By 1983 these additional provisions allowed for abortion in the first twelve weeks of gestation following an approval of a commission if a woman was over 40, had at least three living children, had difficult housing or material conditions, or if the pregnancy was the result of rape or incest. Abortions could have been performed in the first twenty-four weeks of gestation if there was a threat to the mother’s life, or fetal impairment. In 1986, the government enacted the most recent amendment to the abortion law by abolishing the commissions, which reviewed and approved the abortions, and leaving the decision to be made by the pregnant woman (United Nations, 2001). The law,
which came into effect in July 1987, made abortion available on request in the first twelve weeks of gestation (Dudova, 2010). If gestation is over twelve weeks, abortion could be obtained only if the woman’s life is in danger or in the case of fetal impairment (United Nations, 2001).

Hungary went back and forth between liberal and moderately restrictive policies on a couple of occasions before settling on its current policy in the late 1990s. Two laws issued in 1953 and 1956 made abortion available on request in the first twelve weeks of gestation. In 1973, however, several restrictions made abortion more difficult to obtain. In particular, a woman could obtain an abortion in the first twelve weeks if she was single, divorced or widowed, had been separated from her spouse for at least six months, had no available accommodation, or had three children, and in the later stages of the pregnancy if there were exceptional social reasons. The woman had to go through a committee, which was required to authorize abortion if it fell into the aforementioned categories. Similarly to Czechoslovakia, in 1988 Hungary abolished the committee approval, which made abortions more easily obtainable and left the decision to the woman and either a medical specialist or a counsellor (United Nations, 2001). The constitutionality of these ordinances was challenged by anti-abortion groups, which led to the passing of a new abortion law in December of 1992.³ It permitted abortion in the first twelve weeks of gestation if the woman was in a “situation of crisis” as long as she obtained counseling and waited three days after the submission of her application for abortion before having the procedure (Batar, 1993). Moreover, abortion is still permitted later in the pregnancy for health reasons, for a suspected fetal defect, or if the abortion is the result of a criminal act. In 2000, following challenges by anti-abortion groups, the Ministry of Health defined a “situation of crisis” to be “when it causes bodily or mental impairment, or a socially intolerable situation” (United Nations, 2001).

³Note that in my empirical analysis I consider the abortion policy change to have occurred in 1993, since there was only one month left in 1992 when it was enacted, and the effects of changes in abortion policies on birth rates should begin to appear six months later.
2.3 Current Status of Abortion in Eastern Europe

2.3.1 Abortion Demand

Abortion demand in Eastern Europe has seen a steady decline since the 1990s. Sedgh et al. (2016) estimate that abortion was performed 2.6 million times on average in the period between 2010 and 2014, compared to 6 million times annually in the years from 1990 to 1994, constituting a 57 percent decline. Moreover, Eastern Europe observed the largest reduction in annual abortion rates compared to any other region in the world from 88 abortions per 1000 women of child-bearing age in 1990-1994 to 42 in 2010-2014. The region has also seen a decline in the percent of pregnancies that result in abortion between these two periods from 54 percent in the early 1990s to 38 percent currently. While the authors do not offer reasons why this precipitous fall in abortion rates occurred specifically in Eastern Europe, they attribute a wider decline in abortions across developed nations to increased access to sexual and reproductive health. It is possible (or perhaps even likely) that this increase is greater for Eastern European women, since most of them started using modern contraceptives only after their countries opened to Western markets in the early 1990s.

Despite these trends, abortion continues to be much more common in Eastern Europe than across the rest of Europe to this day. Compared to the 2.6 million abortions in Eastern Europe for 2010-2014, the procedure was performed 0.8 million times in Southern Europe, 0.6 million times in Western Europe, and 0.3 million times in Northern Europe. The average percent of pregnancies that resulted in abortion across these three regions in 2010-2014 was 23 percent compared to the Eastern European 38 percent. The difference is greatest in the annual abortion rate, where the measure is twice as high in Eastern Europe, 42 abortions per 1000 women of childbearing age, compared to the average across the other three subregions of 20.7 (Sedgh et al., 2016). A possible explanation for the existing difference is that more effective contraceptive methods are either not widely available or underutilized in Eastern Europe.
2.3.2 Total Fertility Rates

Eastern European fertility rates have declined steadily over the last thirty years, from about 2.1 children per woman in 1970-1975 to 1.6 in 2010-2015.\textsuperscript{4} This has also been the pattern in countries in Western Europe as well, where the total fertility rate fell from 2.0 to 1.7, and in Southern Europe, which experienced the sharpest drop from 2.5 to 1.4, but less so in Northern Europe, where the decline was the smallest, from 2.1 to 1.8 (United Nations, 2015).

Figure 1 shows the total fertility rates for each of the eight countries in my analysis for the year 2015. The fertility rates in the more-developed European Union member-states of the Czech Republic, Romania, and Hungary are about 1.5 children per woman. Perhaps surprisingly, Poland, despite its severely restricted access to abortion, had the smallest fertility rate in that group at about 1.32 children. On the other hand, the former USSR republics and currently less-developed countries have higher fertility rates on average. An outlier in this group is the Kyrgyz Republic whose fertility rate at 3.2 children is almost twice as as that of Armenia, Belarus or the Russian Federation (World Bank, 2016).

2.3.3 Contraception Use and Availability

There are stark differences in rates of contraception use across the Eastern European countries in my analysis.\textsuperscript{5} The rate of modern contraceptive use is highest in the Czech Republic at 65 percent of women of childbearing age, followed by the Russian Federation and Belarus, at 55 percent and 52 percent respectively. Out of modern contraceptives, the IUD is the most popular in the Czech Republic, whereas the male condom dominates in the Russian Federation and Belarus. It is noteworthy that in the Russian Federation the withdrawal method is still highly prevalent; it is practiced by 12 percent of the female population. The situation in Armenia and Kyrgyzstan is much different, where about 50 percent and 42 percent of women of childbearing age use any method of contraceptives. In Armenia, more women, out of those who use contraceptives, rely

\textsuperscript{4}The United Nations considers the following countries part of the Eastern European region: Belarus, Bulgaria, Czech Republic, Hungary, Poland, Republic of Moldova, Romania, Russian Federation, Slovakia, and Ukraine (United Nations, 2015).

\textsuperscript{5}Data on contraception use is most often acquired through surveys, and, unfortunately, the United Nations did not possess such data from the last decade on Hungary, Poland or Romania.
on traditional methods such as rhythm and withdrawal, whereas the vast majority of women who
use contraceptives in the Kyrgyz Republic rely on modern methods, out of which the IUD is most
common (United Nations, 2016). This evidence shows that, even today, many women in Eastern
Europe either do not use contraceptives or rely on less effective traditional methods, which could
imply that they consider abortion another method of controlling their fertility.

3 Literature Review

3.1 Theoretical Framework

Ever since the 1960s, economists have proposed models that could explain how changes in
abortion policies affect the fertility behavior of women, and, consequently, the outcomes of children.
The earliest models of abortion assume that women possess complete information on the potential
outcomes of giving birth, and that contraception always works. Having a child in this set-up will
provide emotional and monetary benefits once it grows old and starts working, but while raising it,
the mother will incur direct monetary costs and opportunity costs, since she could have spent her
time on work, for example. To make a decision on whether or not to give birth, a pregnant woman
simply compares the “benefits” from having a child with the “costs,” since both are assumed
to be known to her. With these assumptions in place, every pregnancy in these models would
result in the birth of a child when its “benefits” supersede its “costs.” In this context, Becker
(1960) introduced the idea that children can be thought of as consumption goods, whose “quality”
represents how much their parents spend on them. A family’s decision on number of children is an
implicit decision on these children’s quality. Specifically, there is a quantity-quality trade-off, since
it is more expensive to spend more on children (increase their “quality”) if there are more of them,
and, analogously, it is more expensive to have more children if parents want to continue spending
high amounts on them (Becker and Lewis, 1973). According to this model, an improvement in
contraceptive techniques has two effects. First, it leads to a decrease in the number of children,
and consequently, to a higher quality of children. Second, because abortion is the ultimate form
of contraception, improving access to it will lower its costs and result in better children outcomes through the effect on female fertility decisions.

The standard models of abortion relax some of the assumptions stated above, acknowledging that contraceptives are not 100 percent effective, and that they do not come at zero cost. These models treat fertility decisions as the result of rational decision-making under uncertainty (Kane and Staiger, 1996; Levine and Staiger, 2004; Ananat et al., 2009). First, women decide on contraceptive intensity, and then, if they become pregnant, they decide whether to abort or to give birth. To solve this problem, we rely on backward induction. Starting with the second decision, women choose the least costly action between abortion and giving birth, implying that any abortion is the result of an unintended pregnancy.\footnote{The term sometimes used in the literature for a birth that would have resulted from such a pregnancy is “unwanted birth,” which despite its negative connotation, simply reflects a case, where the pregnant woman would have preferred to delay child-bearing.} Going back to the first decision, Levine (2007) shows that women would choose a level of contraceptive use where the marginal cost of contraception equals the smaller of the cost of birth or the cost of abortion.

This model has different predictions for the effect of abortion liberalization, reflected as a lowering of the cost of abortion, depending on the severity of abortion restrictions in the initial period. Moving from an abortion ban to abortion available on request leads to a decrease in unwanted births (called “marginal births”), and an increase in pregnancies which are the result of a decline in contraceptive intensity (called “marginal pregnancies”). However, further liberalizing abortion after it had been only moderately restricted may have no effect on unwanted births, but still lead to additional unintended pregnancies and abortions since the increased access to abortion also lowers contraceptive use. In this context, Levine and Staiger (2002) suggest that abortion should be analyzed as a type of insurance policy that protects women from unwanted pregnancies. As such, it alters women’s incentives; given that abortion availability insures women against the adverse event of an unwanted birth, they might be more likely to engage in riskier behavior that would result in a pregnancy. Hence, increased access to abortion (i.e. a reduction in the cost of insurance) would unambiguously result in higher pregnancy rates and higher abortion rates. The
net effect of these responses on birth rates will depend on other factors, such as magnitudes of the increases, and individual women’s preferences.

Gruber et al. (1999) extend these models to incorporate the theory of selection and to predict how abortion policy impacts children’s outcomes. They assume that a child’s outcome is correlated with its mother’s payoff of giving birth; the higher-payoff births have better outcomes. Intuitively, births resulting from non-marginal pregnancies have the highest payoffs, followed by births resulting from marginal pregnancies, then marginal births, which have the lowest pay-offs. Since abortion legalization leads to more marginal pregnancies and fewer marginal births, the effect on the average outcomes in a cohort depends on which of these two trends dominates. At a time of initial abortion legalization, marginal births are reduced, with little or no change to marginal pregnancies, which will increase outcomes on average. However, the effect of liberalizing modest abortion restrictions on children’s outcomes remains unclear.

3.2 Empirical Evidence from the United States

Many studies have documented the effect of changes in American abortion policies on birth rates and the outcomes of children. It has been shown that abortion legalization in the United States had long-term impacts on total fertility, and that the impact differed across women of different demographic groups. Levine et al. (1999) employ a quasi-experimental approach, exploiting the differences in abortion policies in the early 1970s (see Section 2.2.1), and compare the fertility rates across early-repeal states and the rest of the states before and after the Roe v. Wade decision. They estimate that the abortion legalization in the United States resulted in at least a 4 percent immediate drop in birth rates, and that the decline was almost twice as large for non-white and teenage mothers than it was for the non-teen white population. Because this study represents a period analysis – it compares the current fertility rates of women from different age cohorts at the time of the law changes – it cannot conclude that women prefer having fewer children. It could well be that women decided to postpone the birth of a child. Thus, the short-term effects of abortion might not represent a long-term permanent reduction in fertility, which could invalidate the theory of selection. To resolve that issue Ananat et al. (2007) make use of the same abortion policy
changes, but perform a cohort analysis by comparing the completed fertility rates of women who lived through these events when they were most likely to be affected by abortion availability. They find that the reduction in fertility resulting from the legalization of abortion was indeed permanent.

The evidence of the effect of abortion policy changes on fertility rates allows us to then test whether these changes also had an impact on the outcomes of children. The earliest research on abortion selection was done in the context of early birth outcomes. Estimating quasi-structural functions using OLS and TSLS regressions, Joyce (1987) and Grossman and Joyce (1990) document that higher abortion rates led to lower neonatal mortality rates and to lower probabilities of giving birth to a low-birthweight baby. Relying on a quasi-experimental approach similar to those of Levine et al. (1999) and Ananat et al. (2007), Gruber et al. (1999) show that the cohorts of children born immediately after abortion was legalized on average had better living circumstances than the cohorts preceding them. Instrumenting for birth rates with indicator variables for variation of abortion policies across states and years, they also note that the children who were not born as a result of abortion legalization (the marginal children) would have been 40 percent more likely to die as infants had they been carried to term.

The same study also shows that the marginal children would have been 50 percent more likely to live in poverty and 45 percent more likely to receive welfare had they been born. In fact most of the empirical evidence focuses on outcomes of young children and adolescents and supports the theory of positive selection, the notion that children born when abortion was legal were brought up in better circumstances, and had better long-term outcomes than children of the same birth cohort, but born under an abortion ban. Charles and Stephens (2006) find that adolescents born in early-repeal states were significantly less likely to use controlled substances, including illegal narcotics, than adolescents born in a non-repeal state. Using a TSLS strategy similar to that of Gruber et al. (1999), they also find that decreases in birth rates led to decreases in the probability of use of every substance except tobacco. Using the same natural experiments and empirical strategies, but more recent data sources, Ananat et al. (2009) note that the improved outcomes as children also translate to a higher likelihood of college graduation, lower odds of receiving welfare and of being a single parent. Finally, Donohue et al. (2009) show that women who had access to abortion
as teenagers in the 1970s gave birth to children who were less likely to become teenage parents themselves, by regressing the fertility rate by state, year and age of the cohorts of teenagers on the abortion rates in the year when the teenager would herself been in utero.

There is some debate, however, on whether abortion legalization contributed to the significant decline in crime rates in the early 1990s. This may have happened if those who were most at risk of engaging in criminal activity in the 1990s had a lower probability of being born due to the legalization of abortion. In their 2001 paper Donohue and Levitt (henceforth DL) compare crime trends in repeal states versus the rest of the United States and perform OLS regressions of the average crime outcome in a birth cohort on the abortion ratio (ratio of abortions to live births) in the state and year of birth in support of their thesis that abortion legalization can account for 50 percent of the reduction in crime.

Joyce (2004) and Foote and Goetz (2008), however, fail to find evidence in support of this causal relationship. Joyce (2004) uses the quasi-experimental design of Levine et al. (1999) and Gruber et al. (1999), and sees the spread of crack around the United States as a confounding factor to DL’s study since crack markets developed in different cities at different times, and, thus, represent state-year effects not captured by national trends. Perhaps Joyce’s most important critique, though, is that he considers the abortion rate DL put on the right-hand side of the abortion equation as endogenous to sexual activity, contraception and fertility. Moreover, Foote and Goetz (2008) argue for modifications of the within-state comparisons, which DL attempt at the end of their study, and find that with their proposed adjustments the selection effect vanishes.

3.3 Empirical Evidence from Eastern Europe

The literature on the effects of abortion legalization in Eastern Europe follows a trajectory similar to that in the United States. Most studies use variation in abortion legalizations and restrictions that occurred across the USSR and Soviet satellite states in the 1950s and 1960s, and the subsequent reversals of these policies in the late 1980s and early 1990s. Multiple sources confirm the theory that due to lack of access to other contraceptives, abortion played a key role in regulating
fertility in the region; therefore, changes to abortion access are expected to have significant effects on female fertility behavior and, consequently, on the outcomes of children.

Early research by Frejka (1983) compares legal abortion rates in some Eastern European countries before and after they experienced policy changes, and calculates how many of the abortions, possibly due to a more liberalized environment, prevented “unwanted births” and how many replaced contraceptive practices. He finds that many of the new legal abortions prevented births that would have occurred in the absence of legislation (75 percent in Czechoslovakia and 30 percent in Hungary), and some of them (20 percent by the third year in Hungary, and at least 50 percent in Romania) resulted from relaxation of contraceptive use. Levine and Staiger (2004) estimate the impact of abortion policy changes that occurred in some Eastern European countries between 1980 and 1997 on fertility-related behavior by regressing each fertility outcome on the legal status of abortion.\(^7\) In their sample, relaxing severe abortion restrictions led to a decrease in birth rates of at least 9 percent. Further liberalizing a moderately restricted abortion policy has no effect on the birth rate, but a substantial negative impact on the pregnancy rate. The empirical findings of both papers are consistent with the theoretical framework laid out in Section 3.1.

Pop-Eleches (2010) was the first to offer evidence on the demographic groups of Eastern European women that were most impacted by changes in the abortion policy, focusing specifically on the abortion legalization in Romania in 1990. Implementing a difference-in-differences strategy, he finds that less-educated women had larger decreases in fertility outcomes after the policy implementation compared to better-educated women. His findings imply that abortion access is a key determinant of fertility levels, especially for less-educated women.

Research on the Eastern European experience has also looked at the effects of abortion restrictions and legalization on children outcomes. A number of papers (Dytrych et al., 1975; David and Matejcek, 1981; David, 1992 and David et al., 1992) concern a longitudinal study that began in the early 1960s in Czechoslovakia, which compares the outcomes of 110 “treatment” children born to women twice denied abortion for this pregnancy to those of 110 “control” children, pair-matched with respect to mother’s marital status and father’s occupation. They find that differences in the

\(^7\)Their sample includes all countries from my analysis with the exception of Armenia and the Kyrgyz Republic.
outcomes widened over time: the “treatment” children performed slightly poorer in elementary school, but they were significantly less likely to attend secondary school, and more likely to have been referred to a psychiatrist, both as children and as adults. Most importantly these differences seem to have been persisted to late adulthood; “treatment” children were significantly more likely to have troubled relationships with their partners when they were starting families on their own.

Pop-Eleches (2006) shows that children born after the 1966 abortion ban in Romania attended school for longer and had greater labor market success compared to children born just before the abortion ban, but that result is reversed when controlling for the mother’s educational background. This study is consistent with the theory of negative selection – when abortion was restricted, women with better educational backgrounds had more children, and the inflow of these children raised the average cohort outcomes. A more recent study, however, which looks at the 1990 abortion legalization in Romania, finds evidence of the opposite type of selection; children born to parents with increased access to abortion achieved higher scores on Romanian standardized tests and were more likely to attend an academic high school (Malamud et al., 2016). Controlling for parents’ educational attainment does not seem to change the results. Possible explanations reconciling these findings are that the effect of restricting abortion is not symmetrical to that of legalizing abortion, or that selection could act in different directions for different outcomes.

The empirical evidence from Eastern Europe suggests that shifts in abortion policies have substantial impacts on the fertility outcomes in a country, and documents significant negative and positive selection effects resulting from abortion policy changes in Romania. My thesis contributes to this ongoing discussion by considering the impact of several abortion policy changes in multiple Eastern European countries on the educational outcomes of children born when these changes were taking place.
4 Data

4.1 Overview

In my analysis, I rely on census data from 2009, 2010 or 2011 for the eight countries of interest on individuals born between 1985 and 1995.\(^8\) Since the data are aggregated by year and country of birth, I have a total of 88 observations (66 when I exclude Armenia and the Kyrgyz Republic). I chose to focus on these countries due to data availability and the fact that all experienced similar political and economic upheaval in the late 1980s and early 1990s. Because abortion changes took place in 1987, 1990 and 1993, I limit my sample to individuals born 2-3 years before and after that range. For all countries except Armenia and the Kyrgyz Republic, I also use official (non-census) estimates of the female population of child-bearing age for the years between 1985 and 1995.

4.2 Birth Rate

The first dependent variable of interest is the country’s birth rate, measured as the number of people born in a given year divided by that year’s population of women between the ages of 15 and 44, in thousands. I calculate the number of births in a year by counting how many individuals reported that as their birth year in the census. By using this measure of births, I assume that the population of those born between 1985 and 1995 and captured by the census represents all who were born in that period. However, a potential issue arises with this assumption, since all eight countries witnessed substantial emigration in the early 1990s, and some of the individuals born between 1985 and 1995 might not be living in the country at the time of the census. For the six countries with existing official fertility data, I can replace the census-calculated number of births with the official estimate to test whether changes in abortion policies had similar impacts on the two measures. I present these falsification tests in section 6.1.

For the same six countries, I use the official data on the population of women of child-bearing age for the denominator of the birth rate measure. In the observations for Armenia and the Kyrgyz Republic, I extrapolate how many of the women recorded in the census were between 15 and 44 in

\(^8\)The Belarusian and Kyrgyz censuses took place in 2009; the Russian occurred in 2010, and the censuses in the other five countries followed in 2011.
each year between 1985 and 1995. To use this measure, I have to assume that the women captured by the census, who would have been of child-bearing age in the period of interest, are representative of all women of child-bearing age who lived then. Apart from the issue with emigration documented above, an additional problem is that some of the women of child-bearing age during my time period of interest could have died by the time of the census.\textsuperscript{9} I do not have an alternative measure for the female population of fertile age for this period for these two countries. But, as I will demonstrate, my results for just the six countries with official fertility data are similar to the results when I include Armenia and the Kyrgyz Republic as well.

4.3 Educational Outcomes – Primary Education Completion

The main educational outcome of interest is the percent of individuals born in a given country and year who have completed at least primary school by the year of the country’s census, measured as the number of individuals who have indicated in the census that they have completed the first stage of their education divided by the census-estimated number of births in that year. For all countries, primary school lasts for four to six years; therefore, regardless of year of birth or year of census, all individuals should have completed primary school by the time they participated in the census.

Since I am using the census-estimated number of births in the denominator of the primary education completion rate, the potential issue with emigration (documented in Section 4.2) might resurface. Emigration as a whole would not bias my educational outcome estimates if the emigration decision did not depend on a family’s background, if a family with a higher educational attainment was just as likely to leave the country as a family with a lower educational attainment. If, on the other hand, among children born in a given country and year, those coming from more affluent or educated families and who would, arguably, perform better because of their background, emigrated at higher rates than children from less-educated backgrounds, then the cohort composition would have changed by the time it is captured in the census. Unfortunately, given these data it is impossible to test whether emigration patterns differed across backgrounds.

\textsuperscript{9}For example, a woman who was 44 in 1990 in the Kyrgyz Republic faced a life expectancy of 68 years. She would have needed to live to age 73 to be counted in the census in 2009 (World Bank, 2016).
4.4 Educational Outcomes – Lower Secondary Education Completion

I also use another educational outcome, completion of lower secondary education. Some countries break their secondary education into a mandatory lower secondary education part and an additional upper secondary education part. In the cases of Belarus, the Kyrgyz Republic, the Russian Federation and, potentially, Poland, students born in the later years of the period of interest might be too young to have completed lower secondary education by the year of the census. In these instances, I use the percent of individuals born in a country-year who are still in school as the outcome of interest. For Hungary and the Czech Republic, that report data only on completion of primary school and secondary school, I use the percent of individuals who have completed primary school by the year of the census.

5 Empirical Framework

5.1 Overview of the Quasi-Experimental Framework

Given the abortion policy changes outlined above, I employ a quasi-experimental empirical approach where, in a given year, the control group consists of countries that experienced no abortion policy changes, while the treatment group consists of countries that either restricted or liberalized abortion further. This method compares the difference in birth rates or educational outcomes before and after the abortion policy change in a treatment group country relative to the difference in those measures over the same period in the control group countries.

There are a few potential issues with this empirical framework. First, even in the absence of abortion policy changes, there might have been underlying trends in the birth rates or the educational outcomes of children across these countries that might confound my estimates. To deal with this issue I introduce linear or quadratic trends in all my regression specifications, which allows me to distinguish the effect of changes in abortion access from a parametric trend. Second, this framework assumes that the changes in the birth rate caused by these policy shifts had no effects on the children who would have been born anyway. For example, if abortion restrictions increased family size, then as outlined by Becker’s quantity-quality trade-off, parents would spend
less on each child; this family effect may affect all children in the family, even those born prior to any abortion policy changes. Moreover, an increase in the cohort size might lead to an increase in class sizes at school, which could cause a decrease in education completion rates. My results will attribute all changes in educational outcomes to selection, since, unfortunately, there is no way to distinguish the cohort-size effect from the selection effect with this framework.

Before analyzing the specific regression equations, I present figure 2, which depicts the number of births for the three countries with monthly data: Romania, Armenia and the Kyrgyz Republic. The x-axis shows the period before and after July, 1990, the month when the effects of the increased access to abortion in Romania would be expected to surface. There is a steep drop in the number of births in Romania at exactly that point, whereas the births stay stable in the two control countries. All three countries had already started experiencing political and economical instability, so the only way to justify the sudden decline in the Romanian data is through the impact of abortion legalization, which supports my use of quasi-experimental methods. Interestingly, while the drop in Romanian birth rates occurs at the expected month, it stabilizes right away; it seems that following the initial shock, women adapt quickly to the new policy environment.

5.2 OLS Regressions

To estimate the impact of changes in abortion policies on birth rates and educational outcomes on average, I use the following regression:

\[
\ln(outcome)_{ct} = \beta_0 + \beta_1 \cdot 1(Medsoc)_{ct} + \beta_2 \cdot 1(Lifemed)_{ct} + \rho \cdot X_{ct} + \gamma_c + \delta_t + \epsilon_{ct}
\] (1)

where \(outcome\) is birth rate, primary education completion rate or lower secondary education completion rate in a country and year, \(1(Medsoc)\) is a dummy variable equal to 1 if a country’s abortion policy was on medical/social grounds in a given year, \(1(Lifemed)\) is a dummy variable equal to 1 if a country’s abortion policy was only permitted to save a mother’s life or physical health in a given year, and \(X_{ct}\) is a set of variables that control for the percent of women who fall in one of six age categories: 15-19, 20-24, 25-29, 30-34, 34-40, and 40-44, in a country-year. Finally, \(\gamma_c\) are country-fixed effects that account for time-invariant differences between countries, and \(\delta_t\)
are year-fixed effects that control for time shocks that were common across all countries. In some regressions I also add linear or linear and quadratic trends for each country.

Since the omitted abortion category is abortion available on demand, $\beta_1$ estimates the effect of a moderate abortion restriction on the outcome of interest, and $\beta_2$ estimates the effect of an abortion ban on the outcome of interest. Previous empirical work leads me to expect a positive and statistically significant $\beta_1$ and an insignificant $\beta_2$ when the outcome of interest is the birth rate. If there is positive selection in educational outcomes resulting from restricting abortion, these two coefficients should be negative when the outcome is either primary school completion or lower secondary school completion. The opposite is true in the case of negative selection.

5.3 2SLS Regressions

Gruber et al. (1999) introduced a TSLS regression framework, which estimates the difference between the outcome of the marginal child and that of children on average. They show that when regressing the log of the outcome of interest on the log birth rate, the coefficient before the log birth rate equals the gap between the marginal outcome and the average outcome in a cohort in percentage terms. They expect, however, that such a regression would not represent the amount of selection associated only with abortion legalization or restriction, since the majority of variation in birth rates is not due to changes in abortion access. They conclude that a two stage least squares framework, which uses the variation in abortion policies across countries and years to instrument for the log of birth rate, resolves this problem. The first stage equation would be equation (1), where the outcome of interest is log birth rate. The second stage equation is:

$$
\ln(outcome)_{ct} = \pi_0 + \pi_1 \ln(birthrate)_{ct} + \rho X_{ct} + \gamma_c + \delta_t + \epsilon_{ct}
$$

where the control variables are the same as those in equation (1), and the only difference is that in (2) outcome refers only to the educational outcomes. The coefficient $\pi_1$ estimates the difference between the outcome of the marginal and average child. If $\pi_1 > 0$, then the marginal child, which is born when abortion access is restricted, is better off than the average child, which would be
consistent with the theory of negative selection. In the case where \( \pi_1 < 0 \), the results would be consistent with positive selection.

6 Results

6.1 Effect on Birth Rates

Figures 3 and 4 provide visual representation of how the birth rates of countries from the treatment and control groups trended over time. The birth rates of the Czech Republic and Hungary, whose abortion policies changed from available on medical/social grounds to available on request, do not seem to have been affected either by the political changes or by the abortion policy changes, and remain relatively stable throughout the period (Figure 3).

Poland, on the other hand, seems to present the most convincing evidence of the effect of abortion policy changes on a country’s fertility levels. Comparing its birth rates to those of the control group of former USSR countries over time, one can notice that substantial differences appear after 1990, the year the Polish government began restricting access to abortion. While the birth rates of the control group keep falling, those of Poland remain relatively stable and consistently higher for the rest of the period. The continued widening in the gap in birth rates between the two could be explained if women in Poland need a few years to adapt their fertility preferences to the restricted abortion access.

The trend in the birth rates in Romania is harder to interpret. Even though the Romanian birth rate decreased in 1990, when the government lifted the abortion ban, this drop is smaller in magnitude than the one of the control group in the same year, which could imply that abortion policy changes were not a key determinant for the fertility levels in Romania. Moreover, while the birth rates in the former USSR continue to drop, those in Romania actually increase slightly and stabilize around their 1990 level. However, while the USSR birth rate seems to follow a general downward trend throughout the entire period, the Romanian birth rate drops sharply in only two years (1989-1990 and 1990-1991), exactly when abortion is legalized. A potential explanation
for these findings is that the political and economic regional changes had a more substantial and prolonged impact on countries from the former USSR than on Romania.

Table 2 summarizes the effects of changes across the three abortion categories. All columns report the estimate of equation (1) where the outcome of interest is log birth rate. Column (2) adds a linear trend to the equation, and column (3) also includes a squared trend. All regressions provide convincing evidence that changing the abortion policy from available on request to available only to save the mother’s life or physical health has a positive and statistically significant effect on the birth rate. In my preferred estimate, in column (3), the results imply that such a policy change caused a 12.2 percent increase in the birth rate, which is similar to the previously documented 9 percent increase for a larger sample of Eastern European countries (Levine and Staiger, 2004). On the other hand, I find that moderately restricting abortion has a marginally significant (at the 10 percent significance level) positive effect on the birth rate of around 7 percent. These results imply that if selection were to occur, it would be most pronounced for countries that allowed abortion only on the grounds of saving the mother’s life, since the effect of reduced abortion availability on birth rates for this category is the largest and consistently significant at the 5 percent significance level.

Columns (4)-(6) test whether these results are robust to using official birth rate estimates. In column (4), I replace my constructed census birth rates with official birth rate estimates for the six countries that possess such data and keep Armenia and the Kyrgyz Republic in the sample. The point estimate for the more restrictive abortion category is very similar and still statistically significant. The estimate for the second category loses its statistical significance and decreases, which would imply that there might be data discrepancies for countries which had implemented a moderately restricted abortion policy at some point. However, since the point estimates are not starkly different and the one in column (3) was never significant at the 5 percent level, I consider these discrepancies minor. Columns (5) and (6) replicate regressions (3) and (4), but omit Armenia and the Kyrgyz Republic, the two countries that do not have official fertility data estimates. The results for the two abortion categories are almost completely identical to those in (3) and (4), which allows me to conclude that the census data in these two countries are also reliable.
6.2 Effect on Average Primary School Completion Rates

Now I turn to evidence of abortion selection on educational outcomes, starting with its effects on primary education completion rates. Figure 5 depicts the deviation from the 1990 primary school completion rates for the two countries that had abortion available only to save the mother’s life or physical health at some point in the period, Romania and Poland, and the pooled estimates for the countries of the former USSR, the Czech Republic and Hungary. The figure shows that, after 1990, Poland saw a steep increase in the primary school completion rates that, despite a tapering off in the later years, still deviates from the trend of the other countries. Such a trend implies that the process of negative selection was taking place: after abortion was restricted, women from better educational backgrounds had more children, which raised educational outcomes on average. Romania also witnessed a slight increase in a cohort’s average education completion rates that, if due to the abortion legalization that occurred in 1990, actually supports the opposite theory of positive selection. However, the Romanian upward trend in primary education completion rates seems to have begun in 1985, suggesting that the policy change in 1990 may not have influenced the outcomes of children. The primary school completion rates in the former USSR, Czech Republic and Hungary seem relatively stable throughout the time period.

These interpretations are supported by the results in Table 3, which reports the estimates of equation (1) where the outcome of interest is log primary education completion rate. Columns (1) and (2) do not control for a trend, and do not find any statistically significant results, which could be explained by the fact that Poland’s negative selection and Romania’s positive selection effects are canceling each other out. Once I start controlling for trends, however, the Polish negative selection effect seems to dominate, and gains statistical significance; it reaches 0.7-0.8 percent in the specifications in columns (3) and (4), which include only a linear trend. The estimates in columns (5) and (6), where I control for linear and squared trends, imply that severely restricting abortion led to about a 1.6 percent increase in the primary school completion rate, an estimate that is arguably mostly driven by Poland. Notably, when I omit the countries that are not geographically part of Eastern Europe, Armenia and the Kyrgyz Republic, in columns (2), (4) and (6), my results are almost identical to those in their respective counterparts in columns (1), (3) and (5).
findings are consistent with earlier evidence of negative selection in Eastern Europe; Pop-Eleches (2006) found a similar impact on the average outcome in the cohorts born after Romania banned abortion in 1967.

The results on selection when abortion is only moderately restricted are always negative, and the statistical significance disappears once I add a linear and quadratic trend. The lack of evidence of selection in the medical/social category is explained by the findings in Table 2. Since moderately restricting abortion had only marginally significant effects on the birth rates, the policy would not have a strong effect on the outcomes of children born after it was implemented.

Finally, the results for primary school completion rates when abortion is severely restricted imply that the selection effect is stronger than the cohort-size effect. The cohort-size effect implies that restricting abortion would lead to overpopulated schools and result in worse educational outcomes on average. Since I find an improvement in the average educational outcomes, I can conclude that either the cohort-size effect is negligible, or that negative selection was the dominant effect.

6.3 Effect on Average Lower Secondary School Completion Rates

I do not find any evidence of a selection effect on lower secondary school completion rates. Examining Figure 6, I observe an increase in completion rates in Poland after 1990 similar to that in Figure 5, which, however, seems to be a part of a long-term upward trend that will disappear in a regression controlling for trends. The completion rate in Romania seems relatively stable until 1995, when it declines steeply. Since this fall occurred five years after abortion was legalized, I cannot attribute it to the policy change. The control group along with the Czech Republic and Hungary presents interesting evidence; it is the only group whose increase in lower secondary school completion rates following 1990 is not part of a previous trend. It could be that education policies implemented in these countries, but not in Romania or Poland, led to a differential increase in this educational measure. The visual representation of the data implies that I will find no effects of selection. Table 4 where I report the results of estimating equation (1) with log lower secondary education completion rate as the dependent variable confirms that for none of the categories and
in none of the empirical specifications are the results ever statistically significant or substantial in magnitude.

6.4 Effect on Educational Outcomes of the Marginal Child

As explained in Section 1, the theory of negative selection implies that the marginal child, who is born when abortion access is restricted, but not when abortion is legalized, has better outcomes than the average child in its cohort. To determine how the outcomes of the marginal child compare to that of the average child in its cohort, I implement the TSLS framework discussed in Section 5.3. The results of the first stage, shown in Table 2 and presented above in section 6.1, provide convincing evidence that the abortion categories are valid instruments for the birth rate. The second stage results are shown in Table 5, and they support my earlier finding of negative selection in primary education completion rates when access to abortion is severely restricted. In my preferred specification in column (5), where I control for linear and squared parametric trends, I find that the marginal child is 13.7 percent more likely to graduate from primary school than the average child in its cohort. The higher outcome of the marginal child relative to the average child in its cohort confirms the theory of negative selection. Finally, keeping with my earlier results, I fail to find evidence of difference in outcomes between the marginal and the average child when abortion is only moderately restricted, or in lower secondary education completion rates.

7 Conclusion

In this paper I consider whether changes in abortion policies in eight Eastern European countries over the period of 1985 to 1995 had an effect on the birth rates in the countries, and whether children born when their parents had limited access to abortion have different outcomes compared to children born when abortion was available on request. Using a difference-in-differences strategy, I find that restricting abortion from available on request to available only to save a mother’s life increases the birth rate by 12 percent. I also find a marginally significant positive effect on the birth rates when abortion is moderately restricted.
My findings on the outcomes of children support the theory of negative selection. Children born when access to abortion was severely restricted have better outcomes because, due to the abortion ban, there is a higher likelihood that they would be born into a better-educated household. Specifically, these children are 1.6 percent more likely to graduate from primary school than a child who was born when abortion was legal. The marginal child is 14 percent more likely to graduate from primary school than the average child in its cohort. These results are consistent with previous research on the effect of imposing abortion restrictions on children’s educational outcomes in Eastern Europe (Pop-Eleches, 2006). Notably, most empirical evidence based on abortion liberalization in the United States supports the theory of positive selection; restricting abortion results in more children being born in families that would prefer to delay having them, which leads to these children performing worse than children born when abortion is legal. The sign of the selection effect is determined by how accessible abortion is to women from different demographic groups when it is legal. My results imply that, compared to the United States in the 1970s, abortion in Eastern Europe, even when available on request, remains inaccessible to most women, possibly due to a high financial cost.

My results provide an interesting perspective on international abortion policy debates. Along with ethical and philosophical arguments, when debating changes in abortion policies, it is also useful to consider the economics of fertility: whether some groups of women rely more on abortion as contraception, whether a policy shift would have a larger effect for such women, and how the outcomes of children would be affected if they were born under the new policy. These are empirical questions whose answers may influence the policy debate in a non-ideological manner.
# Tables

Table 1: Overview of Abortion Policy Changes in Eight Countries over 1985-1995

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<td>Abortion available for medical/social reasons</td>
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<td>Abortion available to save mother's life or physical health</td>
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<td>Poland</td>
<td>Poland</td>
<td>Poland</td>
<td>Poland</td>
<td>Poland</td>
</tr>
</tbody>
</table>

Note: The Group of Former Soviet Republics includes Armenia, Belarus, the Kyrgyz Republic and the Russian Federation. The dotted lines indicate years when at least one country experienced an official change in its abortion policy, where the country or countries in question are in bold.
Table 2.

<table>
<thead>
<tr>
<th>Abortion available to save</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother's life or physical health</td>
<td>0.00496</td>
<td>0.0488</td>
<td>0.0285</td>
<td>0.0303</td>
<td>0.0327</td>
<td>0.0317</td>
</tr>
<tr>
<td>Abortion available for medical/social reasons</td>
<td>0.0919</td>
<td>0.112</td>
<td>0.0699</td>
<td>0.0402</td>
<td>0.0712</td>
<td>0.0401</td>
</tr>
<tr>
<td>Data on Births for 6 countries</td>
<td>Census</td>
<td>Census</td>
<td>Census</td>
<td>Official</td>
<td>Census</td>
<td>Official</td>
</tr>
<tr>
<td>Includes Armenia and the Kyrgyz Republic?</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

Trend | No Trend | Linear | Linear and Quadratic | Linear and Quadratic | Linear and Quadratic | Linear and Quadratic |

Note: The birth rate estimates for Armenia and the Kyrgyz Republic are constructed entirely from the available census records. The birth rates for the other 6 countries come from the official fertility statistics in columns (4) and (6), or are constructed by dividing the number of births estimated from the censuses over the official data for female population between the ages of 15 and 44. All regressions include year fixed effects and country fixed effects, and control for a country’s percent of female population that is between the ages of 15-19, 20-24, 30-34, 35-39, and 40-44. Robust standard errors clustered at the country level are in parentheses.

* p<0.1 **p<0.05

Table 3.

<table>
<thead>
<tr>
<th>Abortion available to save</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother's life or physical health</td>
<td>0.00640</td>
<td>0.00732</td>
<td>0.00284</td>
<td>0.00377</td>
<td>0.00360</td>
<td>0.00275</td>
</tr>
<tr>
<td>Abortion available for medical/social reasons</td>
<td>-0.0123</td>
<td>-0.0117</td>
<td>-0.0113</td>
<td>-0.00915</td>
<td>-0.00107</td>
<td>-0.000553</td>
</tr>
<tr>
<td>Trend</td>
<td>No Trend</td>
<td>No Trend</td>
<td>Linear</td>
<td>Linear</td>
<td>Linear and Quadratic</td>
<td>Linear and Quadratic</td>
</tr>
<tr>
<td>Includes Armenia and the Kyrgyz Republic?</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

Note: All regressions include year fixed effects and country fixed effects, and control for a country’s percent of female population that is between the ages of 15-19, 20-24, 30-34, 35-39, and 40-44. Robust standard errors clustered at the country level are in parentheses.

* p<0.1 **p<0.05
Table 4.

| OLS Estimates of Impact of Abortion Availability on Log of Lower Secondary Education Completion |
|-----------------------------------------------|--------|--------|--------|--------|--------|--------|
|                                               | (1)    | (2)    | (3)    | (4)    | (5)    | (6)    |
| Abortion available to save mother's life or physical | 0.0150 | 0.0153 | -0.00208 | -0.00427 | 0.00128 | 0.00132 |
| (0.0105)                                      |        |        |        |        |        |        |
| Abortion available for medical/social reasons  | -0.0113 | -0.0105 | -0.0138 | -0.0171 | 0.00920 | 0.00982 |
| (0.0125)                                      |        |        |        |        |        |        |
| Trend                                         | No Trend | No Trend | Linear | Linear | Linear and Quadratic | Linear and Quadratic |
| Includes Armenia and the Kyrgyz Republic?     | Y | N | Y | N | Y | N |

Note: All regressions include year fixed effects and country fixed effects, and control for a country's percent of female population that is between the ages of 15-19, 20-24, 30-34, 35-39, and 40-44. Robust standard errors clustered at the country level are in parantheses.

* p<0.1 **p<0.05

Table 5.

| 2SLS Estimates of Impact of Abortion Availability on Educational Outcomes |
|-------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|
|                                                                         | (1)    | (2)    | (3)    | (4)    | (5)    | (6)    |
| Primary Education Completion                                            | 0.0869* | 0.0876* | 0.0156 | 0.0261 | 0.137** | 0.139** |
| (0.0511)                                                                 |        |        |        |        |        |        |
| Lower Secondary Education Completion                                     | 0.122* | 0.121** | 0.00188 | 0.00293 | -0.0412 | -0.0564 |
| (0.0625)                                                                 |        |        |        |        |        |        |
| Trend                                                                    | No Trend | No Trend | Linear | Linear | Linear and Quadratic | Linear and Quadratic |
| Includes Armenia and the Kyrgyz Republic?                               | Y | N | Y | N | Y | N |

Note: Each estimate is the coefficient on the natural log of birth rate, instrumented for with the three possible abortion categories. All regressions include year fixed effects and country fixed effects, and control for a country's percent of female population that is between the ages of 15-19, 20-24, 30-34, 35-39, and 40-44. Robust standard errors clustered at the country level are in parantheses.

* p<0.1 **p<0.05
9 Figures

Figure 1.

Total Fertility Rate by Country

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Fertility Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armenia</td>
<td>1.62</td>
</tr>
<tr>
<td>Belarus</td>
<td>1.72</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>1.53</td>
</tr>
<tr>
<td>Hungary</td>
<td>1.44</td>
</tr>
<tr>
<td>Kyrgyz Republic</td>
<td>3.20</td>
</tr>
<tr>
<td>Poland</td>
<td>1.32</td>
</tr>
<tr>
<td>Romania</td>
<td>1.52</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>1.75</td>
</tr>
</tbody>
</table>
Figure 2.

Census Births by Country by Month

Note: This figure shows the number of births for the three countries in my dataset with monthly data: Romania, Armenia and the Kyrgyz Republic. Romania changed its abortion policy from available only to save mother’s life to available on request in January, 1990. There were no abortion policy changes in Armenia or the Kyrgyz Republic over the period. The x-axis shows the period before and after July, 1990, the month when the effects of the abortion policy change in Romania would be expected to start surfacing.
Figure 3.

**Constructed Birth Rates for Czech Republic, Hungary and the Control Group**

Note: This figure shows the yearly birth rates (measured as number of births per 1000 women of childbearing age) in the Czech Republic and Hungary, and the average of the birth rates in the countries of the former USSR (Armenia, Belarus, the Kyrgyz Republic and the Russian Federation), weighted by each country’s female population of childbearing age in the given year. The Czech Republic and Hungary changed their abortion policies from available for medical or social reasons to available on request in 1987 and 1993, respectively; there were no abortion policy changes in the former USSR over the period. The birth rate estimates for Armenia and the Kyrgyz Republic are constructed entirely from the available census records. The birth rates for the other countries are constructed by dividing the number of births estimated from the censuses over the official data for female population between the ages of 15 and 44.
Figure 4.

**Constructed Birth Rates for Romania, Poland and the Control Group**

Note: This figure shows the yearly birth rates (measured as number of births per 1000 women of childbearing age) in Romania and Poland, and the average of the birth rates in the countries of the former USSR (Armenia, Belarus, the Kyrgyz Republic and the Russian Federation), weighted by each country's female population of childbearing age in the given year. Romania changed its abortion policy from available only to save mother's life to available on request in 1990. Poland started gradually restricting access to abortion in 1990, but it formally changed its abortion policy from available for medical or social reasons to available on request in 1993. There were no abortion policy changes in the former USSR over the period. The birth rate estimates for Armenia and the Kyrgyz Republic are constructed entirely from the available census records. The birth rates for the other countries are constructed by dividing the number of births estimated from the censuses over the official data for female population between the ages of 15 and 44.
Figure 5.

Deviation from 1990 Primary School Completion Rates by Country

Note: This figure shows the deviation from the 1990 primary school completion rates for Poland and Romania, and the deviation from the 1990 average of the primary school completion rates in the Czech Republic, Hungary and the countries of the former USSR (Armenia, Belarus, the Kyrgyz Republic and the Russian Federation), weighted by each country’s female population of childbearing age in the given year. Romania changed its abortion policy from available only to save mother’s life to available on request in 1990, but it formally changed its abortion policy from available for medical or social reasons to available on request in 1993. The Czech Republic and Hungary changed their abortion policies from available for medical or social reasons to available on request in 1987 and 1993, respectively. There were no abortion policy changes in the former USSR over the period.
Figure 6.

Deviation from 1990 Lower Secondary School Completion Rates by Country

![Graph showing deviation from 1990 lower secondary school completion rates by country.]

Note: This figure shows the deviation from the 1990 lower secondary school completion rates for Poland and Romania, and the deviation from the 1990 average of the lower secondary school completion rates in the Czech Republic, Hungary and the countries of the former USSR (Armenia, Belarus, the Kyrgyz Republic and the Russian Federation), weighted by each country's female population of childbearing age in the given year. Romania changed its abortion policy from available only to save mother's life to available on request in 1990. Poland started gradually restricting access to abortion in 1985, but it formally changed its abortion policy from available for medical or social reasons to available on request in 1993. The Czech Republic and Hungary changed their abortion policies from available for medical or social reasons to available on request in 1987 and 1993, respectively. There were no abortion policy changes in the former USSR over the period.
10 Sources

10.1 Literature Review


David, Henry Philip, and Joanna Skilogianis, eds. *From abortion to contraception: A resource to public policies and reproductive behavior in Central and Eastern Europe from 1917 to the present*. Greenwood Publishing Group, 1999.


10.2 History of Abortion Policies


10.3 Data Sources


