INSTITUTE OF ECONOMICS
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KRTK KTI

Közgazdaság- és Regionális Tudományi Kutatóközpont
KÖZGAZDASÁG-TUDOMÁNYI INTÉZET

CERS-IE WORKING PAPERS | KRTK-KTI MŰHELYTANULMÁNYOK

The long-term impact of restricted access to abortion on children's socioeconomic outcomes

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CERS-IE WP – 2020/31

July 2020

https://www.mtakti.hu/wp-content/uploads/2020/07/CERSIEWP202031.pdf

INSTITUTE OF ECONOMICS, CENTRE FOR ECONOMIC AND REGIONAL STUDIES, BUDAPEST, 2020

ABSTRACT

We examine the long-term consequences of restricted access to abortion following a change in the Hungarian abortion law in 1974. Due to a change that restricted access to legal abortions, the number of induced abortions decreased from 169,650 to 102,022 between 1973 and 1974, whereas the number of live births increased from 156,224 to 186,288. We analyze the effects on the adult outcomes of the affected newborns (educational attainment, labor market participation, teen fertility). We use matched large-scale, individual-level administrative datasets of the Hungarian Central Statistical Office (population census 2011; live birth register), and we estimate the effects by comparing children born within a short timespan around the law change. We apply a difference-in-differences approach, building on the special rules of the new law that, despite the severe restriction, still made abortion permissible for selected groups of women. We control for the compositional change in the population of parents, rule out the effect of (unobserved) time trends and other potential behavioral responses to the law change, and draw causal inferences. We find that restricted access to abortion had, on average, a negative impact on the socioeconomic outcomes of the affected children. Children born after the law change have had worse educational outcomes, a greater likelihood of being unemployed at age 37, and a higher probability of being a teen parent.

JEL codes: J13, J18, I18

Keywords: abortion; long-term effects; socioeconomic outcomes; education and labor outcomes; policy change; Hungary

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Az terhességmegszakításhoz való hozzáférés korlátozásának hosszú távú hatása a gyermekek társadalmi-gazdasági jellemzőire

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ÖSSZEFOGLALÓ

Tanulmányunkban azt vizsgáljuk, hogy milyen hosszú távú következményei voltak a terhességmegszakításhoz való hozzáférés 1974-ben történő korlátozásának. A jogszabályváltozást követően a terhességmegszakítások száma 1973 és 1974 között 169 650-ről 102 022-re csökkent, míg az élveszületések száma 156 224-ről 186 288-ra nőtt. Elemzésünkben a terhességmegszakításhoz való hozzáférés korlátozásának az érintett újszülöttek felnőttkori jellemzőire (iskolai végzettség, munkaerő-piaci részvétel, fiatalkori gyerekvállalás) gyakorolt hatását vizsgáljuk. Az elemzéshez a Központi Statisztikai Hivatal egyéni szintű adminisztratív adatbázisait használjuk (2011. évi népszámlálás; élveszületési adatbázis), és a hatásokat a jogszabályváltozás előtt és után született gyermek összehasonlítása alapján becsüljük. Különbségek különbsége becslést alkalmazunk azt kihasználva, hogy a nők egyes csoportjainak a művi abortuszhoz való hozzáférését a jogszabályváltozás eltérően érintette. A szülők összetételének változására kontrolálva kiszűrjük a (nem megfigyelt) időbeli változások és a lehetséges viselkedési változások hatását, így eredményeinket oksági kapcsolatként értelmezzük. Eredményeink azt mutatják, hogy a terhességmegszakításhoz való hozzáférés korlátozása negatív hatással volt az érintett gyermekek átlagos társadalmi-gazdasági jellemzőire. Az érintett gyermekeknek alacsonyabb volt az iskolai végzettsége, nagyobb valószínűséggel voltak 37 éves korukban munkanélküliek, és nagyobb valószínűséggel váltak felnőttkoruk előtt szülővé.

JEL: J13, J18, I18

Kulcsszavak: terhességmegszakítás; hosszú távú hatások; társadalmi-gazdasági jellemzők; iskolázottság és munkaerőpiaci jellemzők; policy változás, Magyarország

The Long-Term Impact of Restricted Access to Abortion on Children's Socioeconomic Outcomes

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Abstract

We examine the long-term consequences of restricted access to abortion following a change in the Hungarian abortion law in 1974. Due to a change that restricted access to legal abortions, the number of induced abortions decreased from 169,650 to 102,022 between 1973 and 1974, whereas the number of live births increased from 156,224 to 186,288. We analyze the effects on the adult outcomes of the affected newborns (educational attainment, labor market participation, teen fertility). We use matched large-scale, individual-level administrative datasets of the Hungarian Central Statistical Office (population census 2011; live birth register), and we estimate the effects by comparing children born within a short timespan around the law change. We apply a difference-in-differences approach, building on the special rules of the new law that, despite the severe restriction, still made abortion permissible for selected groups of women. We control for the compositional change in the population of parents, rule out the effect of (unobserved) time trends and other potential behavioral responses to the law change, and draw causal inferences. We find that restricted access to abortion had, on average, a negative impact on the socioeconomic outcomes of the affected children. Children born after the law change have had worse educational outcomes, a greater likelihood of being unemployed at age 37, and a higher probability of being a teen parent.

Keywords: abortion, long-term effects, socioeconomic outcomes, education and labor outcomes, policy change, Hungary

JEL codes: J13, J18, I18

Acknowledgment
The work uses individual-level registry data of the Hungarian Central Statistical Office (live births, population census 2011). The calculations and the conclusions within the paper are the intellectual product of the author. The source of funding and the HSCO had no role in the study design, the analysis, and interpretation of data or the writing of the article.

Funding
This work was supported by the Hungarian National Research, Development and Innovation Office – NKFIH (grant no. FK 124384). Tamás Hajdu was supported by the "Lendület" program of the Hungarian Academy of Sciences (grant no. LP2018–2/2018).

Data availability
In this research, administrative registries of the Hungarian Central Statistical Office (live births and census of 2011) were used. The deidentified microdata sets are available only for research purposes in a secure research room of the HCSO.

Ethics approval and consent to participate
No ethical approval was needed for this study because it was based on secondary analysis of the data obtained from the Hungarian Central Statistical Office (HCSO). The study used completely anonymized data with no identifiable information. We accessed the deidentified datasets in the secure data environment of the HCSO (HCSO-CERS research room) after an accreditation process. The researchers were required to sign a contract and a confidentiality commitment.

1. Introduction

The impact of access to abortion is an important topic for scientific research. Changes to abortion rules are a continual issue in public debates, and countries worldwide, as well as some states in the USA, are considering restricting or have recently restricted abortion access. There is extensive literature focusing on the effect of abortion on fertility (Ananat et al., 2007; Antón et al., 2018; Guldi, 2008; Levine et al., 1999; Levine & Staiger, 2004; Pop-Eleches, 2010) and on health at birth (Antón et al., 2018; Grossman & Jacobowitz, 1981; Gruber et al., 1999; Joyce, 1987; Mitrut & Wolff, 2011). On the other hand, evidence on the effects of abortion rules on adult outcomes is based on a limited number of countries and abortion law changes. Most of the relevant papers have analyzed the effects of legalizing abortion in the United States. These papers focus on teen childbearing (Donohue et al., 2009; Ozbeklik, 2014), educational attainment (Ananat et al., 2009; Lin & Pantano, 2015; Whitaker, 2011), poverty, or earnings (Ananat et al., 2009; Gruber et al., 1999; Lin & Pantano, 2015).[1]

Despite the well-documented case of the US, evidence is scarce regarding other countries. For Romania, Pop-Eleches (2006) found that children born after the 1966 abortion ban had worse educational and labor market outcomes when the compositional change of the mothers was controlled for. The results were interpreted as the consequences of the ensuing higher number of unplanned, mistimed, or unwanted pregnancies. In another paper, Pop-Eleches (2009) found that children born following the liberalization of abortion in 1989 had better educational outcomes than children born before the lifting of the ban. Mølland (2016) shows that after access to abortion in Oslo, Norway was liberalized in the 1960s, children of the mothers who had gained access to abortion had increased education and employment achievements and a reduced use of welfare.

Theoretically, a change in the abortion policy might affect the (average) outcomes of children in the long run through a number of mechanisms (Lin & Pantano, 2015; Mitrut & Wolff, 2011; Pop-Eleches, 2006, 2009). First, when abortion is less available, the number of unplanned, mistimed, or unwanted children might increase due to increased costs of abortion (*unwantedness effect)*. This unwantedness effect reflects the direct mechanisms through which restricted access to abortion might have negative effects on children: (i) According to the standard model of child quality-quantity trade-off, an increase in the number of children might decrease the quality of children (Becker, 1993; Becker & Lewis, 1973). (ii) It is also possible

[1] Further research addresses other outcomes, such as crime (Ananat et al., 2009; Donohue & Levitt, 2001, 2008; Foote & Goetz, 2008; Joyce, 2009) or substance use (Charles & Stephens, 2006).

that restricted access to abortion makes women less able to delay childbearing until a more optimal time when it does not conflict with their educational and labor market plans or with their personal circumstances (Angrist & Evans, 2000; Goldin & Katz, 2002; Myers, 2017). This potential conflict might cause unfavorable emotional and material conditions for giving birth and raising a child. (iii) Restricted access to abortion might lead to insufficient or delayed prenatal care due to the unwantedness of the fetus (Chatterjee & Sennott, 2019; Eggleston, 2000; Joyce & Grossman, 1990; Kost & Lindberg, 2015). Second, since cohort size increases after restrictions in abortion rules, a negative *crowding effect* might emerge (Pop-Eleches, 2006). Third, a change in the abortion policy might affect the socioeconomic composition of women carrying pregnancies to term, and this compositional change might influence the average outcomes of children. The direction of this effect is ambiguous both theoretically and empirically. Empirical studies have documented negative effects in the US (Ananat et al., 2009; Gruber et al., 1999; Levine et al., 1996) and positive effects in Romania and Norway (Mølland, 2016; Pop-Eleches, 2006).

In this research, we focus on the unwantedness effect and examine the long-term consequences of the restrictive Hungarian abortion policy introduced in 1974. We analyze the causal effects of the restrictive abortion policy on the later socioeconomic outcomes of the affected children. We compare children born just before and after the law change and utilize the fact that the new abortion rules made abortion permissible for specific groups of women. We use matched large-scale, individual-level administrative datasets (live birth registry and the 2011 census) and apply a difference-in-difference approach, controlling for a rich set of parental sociodemographic characteristics at the time of birth. Using this empirical approach, the compositional change of the parents and the crowding effect are controlled for; thus, we measure the unwantedness effect.

We find that the restrictive Hungarian abortion policy had, on average, negative long-term impacts on the affected children. Compared to children born just before the restriction, children born after the law change have had worse educational outcomes (e.g., fewer years of education), a greater likelihood of being unemployed at age 37 and a higher probability of having been a teen parent.

This paper contributes to the literature in several ways. First, as we noted, there are only a few papers that analyze the long-term impact of abortion restrictions on affected children outside the US. Since changes in abortion laws are rare, any evidence about the impacts of previously uninvestigated legal changes offers important insights and helps to obtain a more complete

picture of the consequences of access to abortion. For example, access to abortion was restricted in Romania in 1966, and there were extreme regulations that made abortion and family planning illegal for almost every woman. The change in Hungarian law in 1974 was less extreme; thus, our paper provides information about how a less drastic policy change affects the socioeconomic outcomes of children. Additionally, we do not know of other papers that analyze the impact of abortion restrictions (rather than the impact of legalization) on the long-term outcomes of children. Second, most of the previous papers, except those of Pop-Eleches (2006) and Lin and Pantano (2015), have been unable to distinguish the mechanisms through which changes in abortion law affect the outcomes of children. Here, we focus on one specific mechanism: the consequences of the increased number of unwanted children due to the new restrictions. Finally, we use individual-level registry data and apply a difference-in-difference strategy that is rare in the literature.[2]

The paper is structured as follows. First, the law change is introduced (Section 2). Section 3 presents the data and empirical strategy. Section 4 shows the results and the robustness tests. Section 5 discusses the limitations of the study, and Section 6 concludes the paper.

2. Background

In the second half of the 1950s, Hungarian abortion rules could be considered liberal. Although abortion committees had to approve all requests for abortion, women had exclusive control over the fetus. Permission to terminate the pregnancy was given to the mother if she reaffirmed the request after receiving information about abortion (Sándor, 1999).

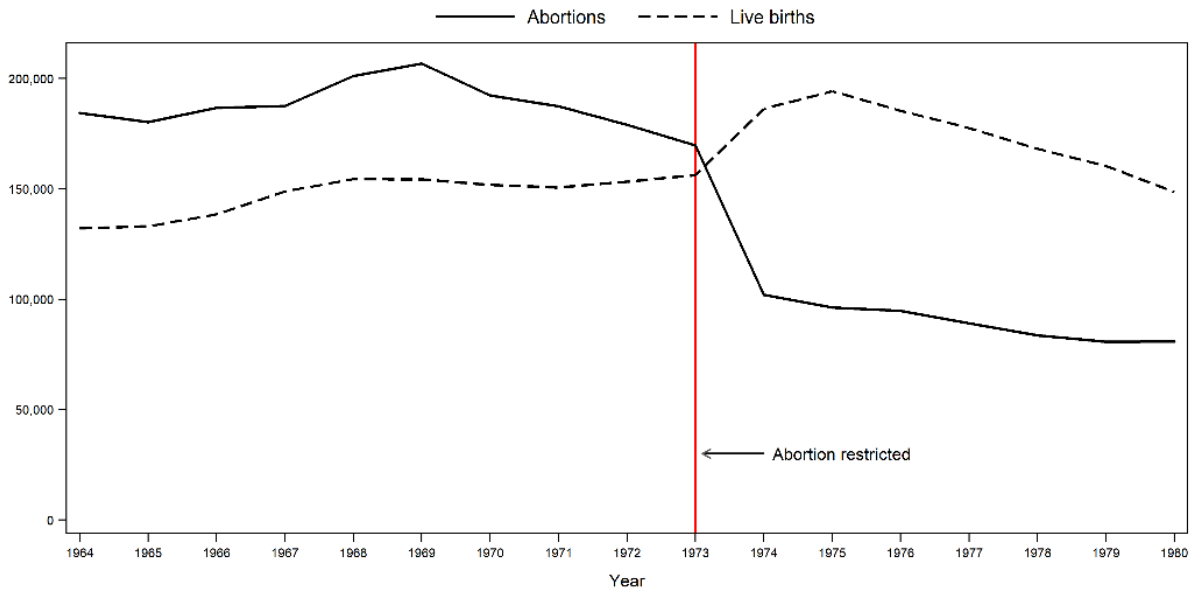
On January 1, 1974, new, restricted abortion rules were introduced. Formally, the rules were justified as intending to protect women's health, but the real goal was to reduce the high number of abortions and increase fertility (Gal, 1994). The most important change was that access to abortion was restricted to specific groups: unmarried women, women with three or more children, women over the age of 35, women with serious housing problems or living in poverty, and cases when pregnancy would cause serious health hazards for the mother (Gal, 1994; Haney, 2002; Sándor, 1999). Moreover, women seeking abortion for nonmedical reasons were charged a substantial fee (Sándor, 1999; Szalai, 1988).[3] In each case, abortion committees decided whether to grant the abortion request. These committees consisted of one doctor, one visiting healthcare professional, and one-three lay members who were chosen by the head of

[2] Only Mølland (2016) uses a similar empirical approach.
[3] The fee was 20-35% of the average gross monthly earnings of employees.

the health department of the district soviet (Sándor, 1999). Applications had to be submitted to the abortion committees in person, and women requesting abortion had to be present when the committee made a decision on their request. This application procedure was humiliating and corrupt, even for women who had a good chance of a positive decision (Gal, 1994; Haney, 2002; Szalai, 1988). Additionally, a media campaign attacked abortion (and birth control methods) as "unacceptable in a socialist society" since it was rooted in the "'unhealthy' spirit of individualism" (Gal, 1994, p. 264).

Figure 1 shows that the law change had a substantial effect on the number of live births and the number of induced abortions. Between 1973 and 1974, the number of induced abortions decreased from 169,650 to 102,022, and the number of live births increased by 30,000 (from 156,224 to 186,288). In other words, the number of induced abortions per 100 live births decreased by 50%, dropping from 108.6 to 54.8. On the other hand, the decrease in the number of induced abortions was twice as large as the increase in the number of births. This might reflect a relatively quick adaptation to the new rules. Although the governmental decision about the changes was made in October, as early as summer, information on the planned changes to the law was available; therefore, women were not entirely "surprised" by the policy change. There is also indirect evidence that suggests that illegal or semi-illegal abortions that were not included in the official statistics might have supplemented the number of legal abortions (Bognár & Czeizel, 1976; Czeizel et al., 1984). Last, access to contraceptives increased in the early 1970s (Makay, 2016), which might also play a role in the adaptation process.

Figure 1: Number of induced abortions and live births between 1964 and 1980



Source: Hungarian Central Statistical Office (http://www.ksh.hu/docs/eng/xstadat/xstadat_long/h_wdsd001a.html and http://www.ksh.hu/docs/eng/xstadat/xstadat_long/h_wdsd001b.html)

3. Methods

3.1. Data

We use matched large-scale, individual-level administrative datasets of the Hungarian Central Statistical Office (HCSO) (population census of 2011 and live birth register). The birth register includes every live birth in Hungary since 1970. We accessed the deidentified datasets in the Research Room of the HCSO, where protection of individual statistical data is ensured. We link the birth records to the 2011 census to identify long-term outcomes. The variables we use for the linkage were the exact date of birth, the sex of the newborn, and the place of residence at the time of birth. The proportion of linked birth records was 34.5% for live births between 1971 and 1979.

This matched dataset contains information on the date of birth, sex of the newborn, characteristics of both parents at the time of birth (i.e., age, education, marital status, employment, occupation code from the standard classification of occupations in Hungary, place of residence, and mother's pregnancy history), and socioeconomic characteristics of the children in 2011. With the exception of socioeconomic characteristics of the children in 2011 (outcome variables), all variables used in our analysis came from the birth records. We use eight outcome variables. First, educational achievement is measured (1) as having a university degree or (2) as having only primary education and (3) by the number of years of education completed. Second, labor market activity is measured by (4) not being employed (according to the ILO definition), (5) working (self-categorization), or (6) being unemployed (self-categorization). We also determine (7) whether the child became a teen parent and, as the only available welfare indicator, (8) whether the child or her/his family own the dwelling where she/he lives.

3.2. Empirical strategy

We utilize the fact that the new rules permitted abortions for women who were at least 35 years old. Therefore, we compare children born to mothers who were under age 35 at the time of conception and children born to mothers who were over age 35 at the time of conception. To ensure that the groups are as similar as possible, we use a ±1.5-year time range, and we exclude women who were approximately 35 years old because we have no information about the exact decision-making process of the abortion committees, and we do not know how they evaluated the abortion requests of women near the age limit. Specifically, we use the mother's age at giving birth because data for her age at the time of conception and for the length of gestation in the birth register are less reliable for the first half of the 1970s. The group of mothers over age 35 at the time of conception consisted of women who were 35.77-37.27 years old at the time of

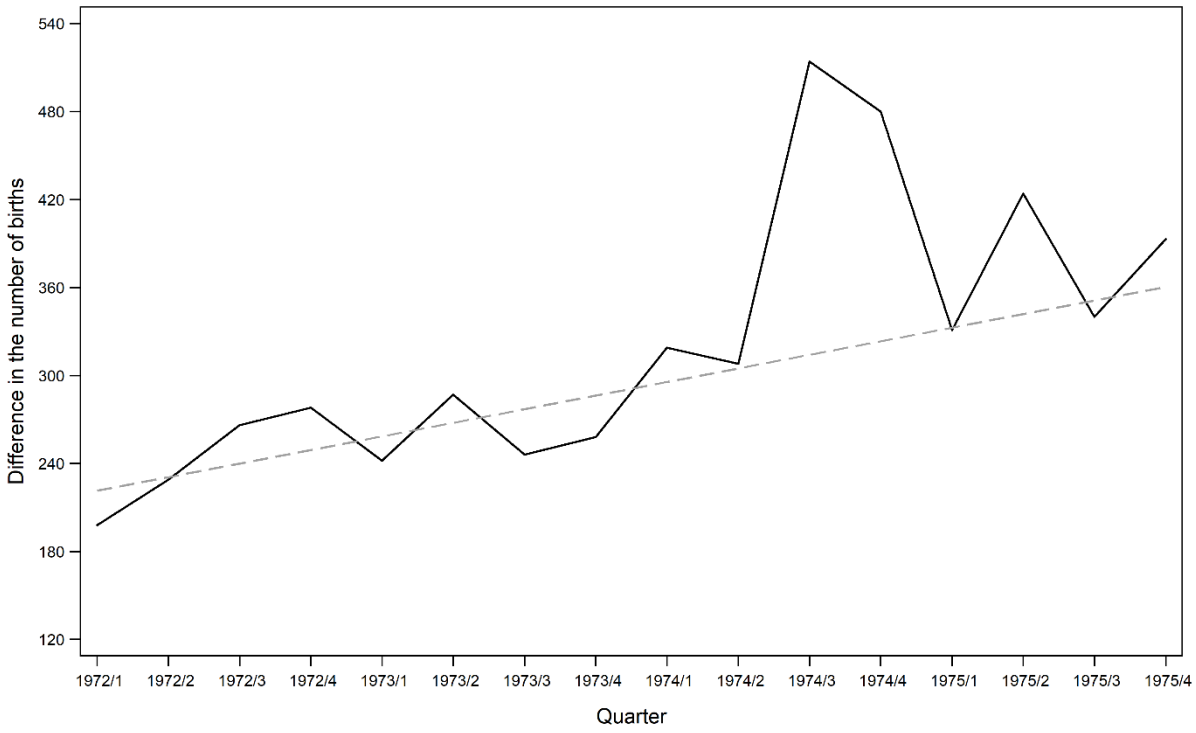
giving birth, and the group of mothers under age 35 at the time of conception consisted of women who were 33.88-35.38 years old at the time of giving birth. The length of most pregnancies is 40 weeks (0.77 years), and abortion was available before the 12th week of pregnancy (0.15 years). Therefore, mothers in the first ("over age 35") group were at least 35 years old when they conceived, and mothers in the second ("under age 35") group were 35 years old or younger in the 12th week of pregnancy, even if they gave birth in the 33rd week.

Figure 2 shows that the difference between the number of births among mothers under age 35 and the number of births among mothers over age 35 increased in the second half of 1974 and then largely returned to previous levels by 1975. This is in line with the fact that restricted abortion rules affected women under age 35 and women over age 35 differently.[4] Nevertheless, this graph suggests that relatively quick adaptation occurred. This adaptation process may have included the increased use of available legal birth control technologies (Makay, 2016) or resorting to an illegal or semi-illegal abortions (Bognár & Czeizel, 1976; Czeizel, 1983). It is also possible that women became familiar with the decision-making process of the abortion committees and were able to argue their cases convincingly (Gal, 1994; Szalai, 1988).

We estimate the effects of the law change by comparing children born just before and after the new law came to effect, which is a similar empirical strategy to those used by Pop-Eleches (2006, 2009) and Mitrut and Wolff (2011). Specifically, we compare children born between July and September 1974 to children born between April and June 1974, i.e., we compare children whose mothers had full access to abortion and children whose mothers had no access or restricted access to abortion. Using a reasonably short time span, we are able to rule out the effects of other (unobserved) time trends and other potential behavioral responses to the law change, and we can draw causal inferences.

[4] In addition, Figure A1 shows the number of births for the two groups of mothers. Table A1 reports the results of regression models using monthly data that show that the increase among mothers under age 35 was significant, whereas there was no relevant change among mothers over age 35. Columns 3 and 4 include data for 1973 and show that the increase cannot be explained by seasonal differences, which are similar across years.

Figure 2: The difference between the number of births among mothers under age 35 and mothers over age 35



The graph shows quarterly values. The solid line shows the difference in the number of births. The dashed line shows the predicted values based on a linear OLS regression using data between 1972/1 and 1974/2. Difference: number of births among mothers under age 35 − number of births among mothers over age 35. Mothers under age 35 at the time of conception were 33.88-35.38 years old when giving birth; mothers over 35 at the time of conception were 35.77-37.27 years old when giving birth.

Using mothers in these two age groups, we apply a difference-in-differences framework to estimate the causal impact of abortion restrictions on the socioeconomic outcomes of children in 2011 (at approximately age 37). We estimate the following equation:

$$Y_i = \beta_0 + \beta_1 Under35_i + \beta_2 After_i + \beta_3 Under35_i \times After_i + \beta_4 X_i + \varepsilon_i \quad (1)$$

where Y_i is an outcome of interest for child i, and $Under35_i$ is a dummy that takes the value of 1 if the child is born to a mother who was under age 35 at the time of conception and 0 if the child is born to a mother who was over age 35 at the time of conception. $After_i$ is a dummy that takes the value of 1 if the child is born between July and September 1974 and 0 if the child is born between April and June 1974. X_i is a vector of control variables that includes the newborn's sex, characteristics of the mother (at the time of birth), characteristics of the father (at the time of birth), and interaction terms for some of the parents' characteristics.[5] Although the

[5] For the full list of control variables: see Table 1. Summary statistics of the outcome variables and the most important control variables are shown in Table A2.

composition of women carrying pregnancies to term might be different after changes in the abortion policy, with the rich set of control variables, we can control for a substantial part of this composition effect. With the difference-in-difference framework we use, the crowding effect is less of a concern because both groups are equally affected by the possible impacts of the change in cohort size after the law change. Therefore, our empirical strategy captures the unwantedness effect. Specifically, the key coefficient is β_3, which reflects the unwantedness effect. Equation (1) is estimated using an OLS regression. Standard errors are robust to heteroscedasticity.

It is worth noting that mothers under age 35 might have requested abortion on looser grounds (e.g., serious social or housing problems); however, these are less objective criteria than age. This means that although these women could theoretically still access abortion, the level of access the women under age 35 and over age 35 had to abortion differed significantly. The main advantage of this empirical strategy is that we can assume that these two groups of women were very similar in terms of other (unobserved) characteristics but differed significantly in their probability of access to abortion.

4. Results

4.1. Main results

Table 1 shows the estimated effects (β_3 coefficients) on the eight socioeconomic outcomes. Each row shows the result for different outcome variables. We find that the restrictions decreased educational achievement (Rows 1-3). Children born after the law change to mothers under the age of 35 were less likely to have a university degree in 2011, had a higher probability of having only primary education, and had completed 0.7 fewer school years. The results also suggest a negative effect on labor market outcomes (Row 4-6). Children affected more strongly by the law change were more likely to not have employment and to classify themselves as unemployed. On the other hand, although the estimated coefficient is negative on the probability of working (self-categorization), it is not significant at the 10% level. Finally, we see a sizable increase in the probability of the affected persons having a child before age 18 (Row 7) and a decrease in the probability of them being the owner of their own residence (Row 8). These effects are fairly large, and their sizes are comparable to the results of Lin and Pantano (2015), who used US data and found that being an unintended child causes a decrease in completed years of education 3.5 years and a 19 percentage point increase in the probability of being a high school dropout.

Table 1: The effect of abortion restrictions on socioeconomic outcomes in adulthood

	Under35 × After (β_3)	Robust SE	p	N
(1) University degree	-0.046	0.025	0.066	1124
(2) Primary education	0.112	0.055	0.041	1124
(3) Years of education completed	-0.699	0.330	0.034	1124
(4) Not having employment (ILO)	0.104	0.058	0.074	1124
(5) Working	-0.074	0.059	0.210	1124
(6) Unemployed	0.077	0.042	0.069	1124
(7) Teen parent	0.060	0.029	0.042	1124
(8) Owner of their residence	-0.090	0.043	0.034	1124

Under35 × After (β_3) shows the effect of the restricted access to abortion of mothers under age 35 compared to mothers over age 35. The estimates come from Equation (1). Mothers under age 35 at the time of conception were 33.88-35.38 years old when giving birth. Mothers over 35 at the time of conception were 35.77-37.27 years old when giving birth. Control variables: Sex of the newborn, week of birth, characteristics of the mother (education, labor force status, occupation, type of employment, birth month, marital status, first language, number of pregnancies, number of live births, number of years since the previous live birth, county, type of settlement), characteristics of the father (age, squared age, education, labor force status, occupation, type of employment), and interactions for characteristics of the parents (education, occupation, labor force status, type of employment).

4.2. Robustness of the results

Next, we perform several robustness checks. First, we estimate a triple difference model by including data from children born in 1973. Namely, we include children born in April-September in 1973. In this way, we can control for seasonal differences that might affect the two groups of children (born in April-June and born in July-September) differently.

We estimate the following equation:

$$Y_i = \beta_0 + \beta_1 Under35_i + \beta_2 After_i + \beta_3 Y74_i + \beta_4 Under35_i \times After_i + \\ + \beta_5 Under35_i \times Y74_i + \beta_6 After_i \times Y74_i + \beta_7 Under35_i \times After_i \times Y74_i + \beta_8 X_i + \varepsilon_i \quad (2)$$

where Y_i and $Under35_i$ are identical to those in Equation (1). $After_i$ is a dummy that takes the value of 1 if the child is born between July and September and 0 if the child is born between April and June. $Y74_i$ is a dummy that takes the value of 1 if the child is born in 1974 and 0 if the child is born in 1973. X_i is a vector of control variables that is identical to those in Equation (1). In this specification, β_7 captures the unwantedness effect.

Table 2 shows these results. In general, the size of the estimated coefficients is similar to the main results in Table 1, but coefficients on the labor market outcomes are estimated with greater uncertainty. Overall, these models suggest that seasonal differences do not drive the estimated impacts.

Table 2: The effect of abortion restrictions on socioeconomic outcomes, triple differences

	Under35 × After × Y74 (β_7)	Robust SE	p	N
(1) University degree	-0.088	0.039	0.024	2150
(2) Primary education	0.143	0.073	0.052	2150
(3) Years of education completed	-0.844	0.453	0.063	2150
(4) Not having employment (ILO)	0.084	0.081	0.296	2150
(5) Working	-0.047	0.082	0.565	2150
(6) Unemployed	0.094	0.060	0.117	2150
(7) Teen parent	0.084	0.038	0.028	2150
(8) Owner of their residence	-0.132	0.055	0.017	2150

Under35 × After × Y74 (β_7) shows the effect of the restricted access to abortion that mothers under age 35 have compared to mothers over age 35 using a triple difference model with data from 1973 and 1974. The estimates come from Equation (2). Mothers under age 35 at the time of conception were 33.88-35.38 years old when giving birth. Mothers over 35 at the time of conception were 35.77-37.27 years old when giving birth. Control variables: see Table 1.

To verify that the results are not due to coincidence or model misspecification, we perform two additional placebo tests: using (i) placebo groups and (ii) placebo law changes. First, the two groups of children are changed to children of mothers who were identically affected by the restricted access to abortion. We compared children of mothers under age 32 and children of mothers over age 32 using a ±1.5-year time range identical to the main model.[6] The estimated coefficients are close to zero or point in a theoretically "wrong" direction (Table A3 in the appendix). These estimations support the credibility of the baseline results.

Next, to check that the estimated impacts do not merely reflect a general trend in these years, a placebo reform test is performed. We use data from other years between 1971 and 1979, and we assume that the new law was introduced one or more years before or after 1974. We estimate the effect of placebo law changes in these years, applying an empirical approach that is identical to what we used before. We expect to see insignificant coefficients for the years before and after 1974. For every year, we count the number of significant coefficients with the expected sign. In the benchmark year of 1974, seven (out of eight) coefficients are significant at the 10% level, and four coefficients are significant at the 5% level (Table 3). In other years, the coefficients are hardly significant, which confirms that the baseline results are not driven by any general trend in the outcomes or by standard seasonal differences.

[6] Specifically, we compare children born to mothers who were 32.77-34.27 years old at the time of giving birth (mothers over age 32 at the time of conception) and children born to mothers who were 30.88-32.38 years old at the time of giving birth (mothers under age 32 at the time of conception).

Table 3: The results of the placebo law changes

	Years								
	1971	1972	1973	1974	1975	1976	1977	1978	1979
Number of significant coefficients at the 10% level	1	0	0	7	0	0	1	0	0
Number of significant coefficients at the 5% level	1	0	0	4	0	0	0	0	0

The number of significant coefficients from regressions using placebo law changes between 1971 and 1979 and identical models to the main model. 1974: results of the main model (Table 1). Control variables: see Table 1.

5. Limitations

The paper has some limitations. First, birth records of children born to mothers living in smaller settlements are more likely to be linked to the census of 2011. Our findings are valid for this population and cannot necessarily be generalized to other children. It is possible that the costs of abortion for women in smaller settlements were higher than those for women in larger settlements due to the stronger physical and social barriers the former face. In this case, the effects for children of mothers from larger settlements might be smaller. Second, in 1973, other policies were also introduced (e.g., increased childcare allowance, housing support) that might have affected fertility among women; however, these changes might have had positive impacts on the later life outcomes of the affected children (Amarante et al., 2016; Bradley et al., 2011). Moreover, these policies are likely to have similarly affected the children of mothers under age 35 and those of mothers over age 35. Therefore, we think that the estimated difference between the two groups is very likely to be unaffected by these policy changes. Finally, a sizeable number of the children were born regardless of the law; hence, the estimated effects are intention-to-treat effects, and the treatment-on-the-treated effects might be higher.

6. Conclusion

This paper has estimated the long-term impact of the restrictive 1974 Hungarian abortion policy. We focused on the socioeconomic outcomes of the affected children in adulthood. Our results suggest that the restrictive abortion policy had, on average, a negative impact on the later socioeconomic outcomes of these children's lives. Compared to children born just before the restriction came to effect, children born after the law change had worse educational outcomes, were more likely to be unemployed at age 37 and had a higher probability of being a teen parent. We argue that these estimations reflect an unwantedness effect.

In line with other papers, our results also highlight the importance of early life circumstances in shaping later life outcomes (Almond et al., 2018; Black et al., 2007; Currie, 2009; Oreopoulos et al., 2008). Since significant changes in abortion laws are rare and the effects of the restrictions put in place by abortion legislation are even more rarely analyzed, our results provide important insights about the consequences of access to abortion and family planning (Bailey et al., 2019). Since abortion policy is still an important issue in many countries' public debates (e.g. Conti et al., 2016), these results could provide significant information for evidence-based policies.

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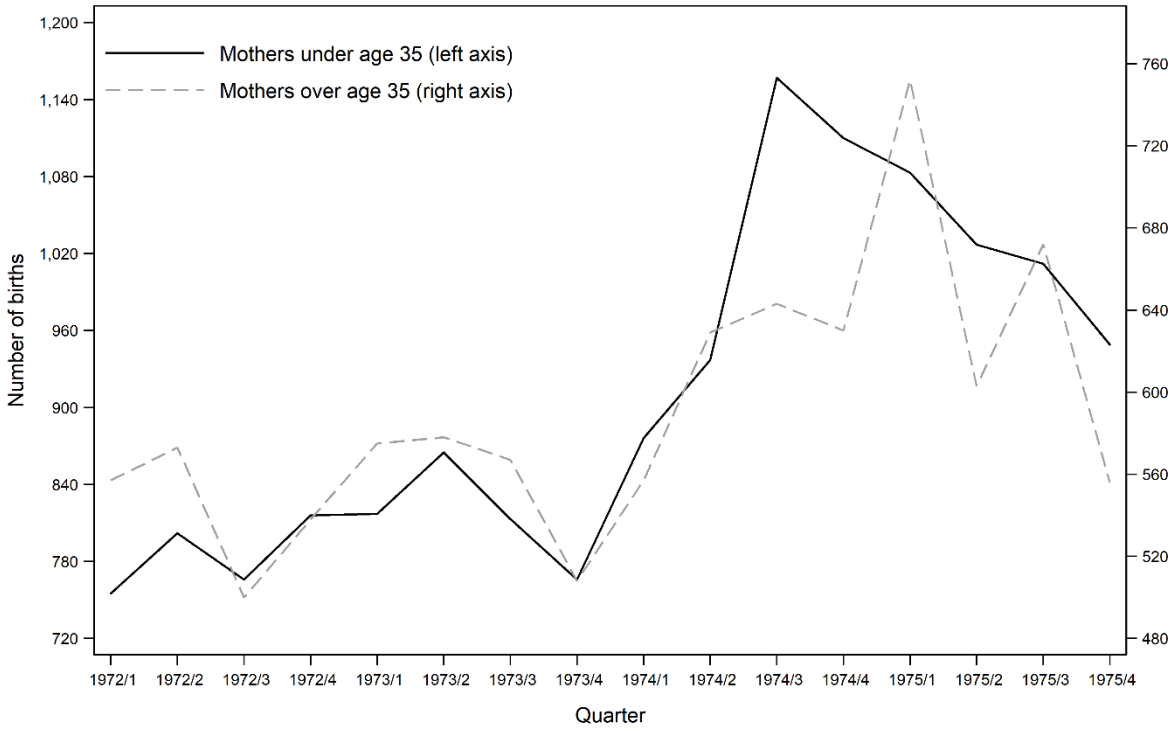
Appendix

Figure A1: Number of births among mothers under age 35 and mothers over age 35



The graph shows quarterly values. Mothers under age 35 at the time of conception were 33.88-35.38 years old when giving birth (left axis). Mothers over 35 at the time of conception were 35.77-37.27 years old when giving birth (right axis).

Table A1: Trends in the number of births in 1974 and 1973-1974, OLS

	(1) 1974, Jan-Dec	(2) 1974, only Apr-Sep	(3) 1973-1974, Jan-Dec	(4) 1973-1974, only Apr-Sep
Second half of the period	14.500	4.667	-13.000	-3.667
	(9.455)	(13.199)	(10.822)	(11.963)
	[0.141]	[0.733]	[0.237]	[0.763]
Mothers under age 35	104.500	102.667	88.167	95.667
	(12.718)	(19.542)	(11.956)	(17.895)
	[0.000]	[0.001]	[0.000]	[0.000]
Mothers under age 35 × Second half of the period	61.167	68.667	-4.167	-13.667
	(15.273)	(24.942)	(15.192)	(21.738)
	[0.001]	[0.025]	[0.785]	[0.538]
1974			5.500	17.000
			(11.908)	(12.499)
			[0.647]	[0.193]
1974 × Second half of the period			27.500	8.333
			(14.371)	(17.814)
			[0.063]	[0.646]
1974 × Mothers under age 35			16.333	7.000
			(17.455)	(26.497)
			[0.355]	[0.795]
1974 × Mothers under age 35 × Second half of the period			65.333	82.333
			(21.542)	(33.086)
			[0.004]	[0.024]
N	24	12	48	24

Dependent variable: number of births, monthly. Mothers under age 35 at the time of conception were 33.88-35.38 years old when giving birth. Mothers over 35 at the time of conception were 35.77-37.27 years old when giving birth. Mothers under age 35 × Second half of the period shows how the number of births increased among mothers under 35 in the second half of the period using data for 1974. 1974 × Mothers under age 35 × Second half of the period shows how the number of births increased among mothers under 35 in the second half of the period in 1974 using data for 1973-1974. Second half of the period: July-December for the whole year; July-September for April-September. Robust standard errors are in parentheses, p-values are in brackets.

Table A2: Summary statistics

	Period	Under 35	Over 35	Diff.	p	$N_{Under35}$	N_{Over35}
University degree	Before	0.056	0.029	-0.027	0.120	304	245
	After	0.045	0.083	0.039	0.056	359	216
Primary education	Before	0.207	0.343	0.136	0.000	304	245
	After	0.223	0.218	-0.005	0.883	359	216
Years of education completed	Before	11.47	10.65	-0.819	0.001	304	245
	After	11.42	11.61	0.194	0.414	359	216
Not having employment (ILO)	Before	0.234	0.318	0.085	0.026	304	245
	After	0.256	0.241	-0.016	0.678	359	216
Working	Before	0.757	0.665	-0.091	0.018	304	245
	After	0.735	0.727	-0.009	0.823	359	216
Unemployed	Before	0.069	0.131	0.062	0.015	304	245
	After	0.111	0.097	-0.014	0.593	359	216
Teen parent	Before	0.039	0.078	0.038	0.055	304	245
	After	0.045	0.042	-0.003	0.869	359	216
Owner of their residence	Before	0.888	0.841	-0.047	0.105	304	245
	After	0.903	0.921	0.019	0.448	359	216
Sex: female	Before	0.500	0.473	-0.027	0.537	304	245
	After	0.479	0.514	0.035	0.420	359	216
Mother's education: primary	Before	0.836	0.878	0.042	0.166	304	245
	After	0.827	0.833	0.006	0.852	359	216
Mother's education: vocational	Before	0.016	0.020	0.004	0.731	304	245
	After	0.039	0.014	-0.025	0.085	359	216
Mother's education: high school	Before	0.102	0.082	-0.020	0.415	304	245
	After	0.109	0.111	0.002	0.927	359	216
Mother's education: university	Before	0.046	0.020	-0.026	0.103	304	245
	After	0.025	0.042	0.017	0.269	359	216
Mother's residence: Capital	Before	0.016	0.037	0.020	0.134	304	245
	After	0.033	0.028	-0.006	0.707	359	216
Mother's residence: Town with county rights	Before	0.030	0.016	-0.013	0.310	304	245
	After	0.019	0.019	-0.001	0.934	359	216
Mother's residence: Town	Before	0.385	0.396	0.011	0.792	304	245
	After	0.365	0.319	-0.045	0.268	359	216
Mother's residence: Village	Before	0.569	0.551	-0.018	0.672	304	245
	After	0.582	0.634	0.052	0.217	359	216
Mother's language: Hungarian	Before	0.987	0.976	-0.011	0.325	304	245
	After	0.986	0.995	0.009	0.289	359	216
Mother's language: Roma	Before	0.007	0.020	0.014	0.152	304	245
	After	0.014	0.005	-0.009	0.289	359	216
Mother's labor force status: Working	Before	0.641	0.522	-0.119	0.005	304	245
	After	0.607	0.667	0.059	0.154	359	216
Mother's occupation: Non-manual	Before	0.251	0.263	0.012	0.810	207	137
	After	0.278	0.303	0.024	0.608	230	152
Mother's occupation: Manual	Before	0.749	0.737	-0.012	0.810	207	137
	After	0.722	0.697	-0.024	0.608	230	152
Father's age	Before	36.81	38.45	1.64	0.000	300	242
	After	37.13	39.41	2.29	0.000	355	209
Father's education: primary	Before	0.750	0.715	-0.035	0.358	300	242
	After	0.715	0.775	0.060	0.120	355	209
Father's education: vocational	Before	0.107	0.161	0.054	0.062	300	242
	After	0.149	0.086	-0.063	0.029	355	209
Father's education: high school	Before	0.087	0.079	-0.008	0.733	300	242
	After	0.082	0.086	0.004	0.854	355	209
Father's education: university	Before	0.057	0.045	-0.011	0.559	300	242
	After	0.054	0.053	-0.001	0.964	355	209
Father's labor force status: Working	Before	0.997	0.988	-0.009	0.221	300	242
	After	0.997	0.986	-0.012	0.115	355	209
Father's occupation: Non-manual	Before	0.155	0.135	-0.020	0.512	304	245
	After	0.142	0.139	-0.003	0.916	359	216
Father's occupation: Manual	Before	0.845	0.865	0.020	0.512	304	245
	After	0.858	0.861	0.003	0.916	359	216

Mothers under age 35 at the time of conception were 33.88-35.38 years old when giving birth. Mothers over 35 at the time of conception were 35.77-37.27 years old when giving birth.

Table A3: The effect of abortion restrictions on socioeconomic outcomes, placebo groups

	Under32 × After (β_3)	Robust SE	p	N
(1) University degree	0.020	0.021	0.352	1974
(2) Primary education	0.021	0.033	0.533	1974
(3) Years of education completed	-0.128	0.230	0.578	1974
(4) Not having employment (ILO)	-0.015	0.018	0.402	1974
(5) Working	0.023	0.041	0.572	1974
(6) Unemployed	-0.022	0.041	0.588	1974
(7) Teen parent	0.001	0.029	0.980	1974
(8) Owner of their residence	0.070	0.029	0.015	1974

Mothers under age 32 are compared to mothers over age 32 using a ±1.5-year time range similar to Table 1. Mothers under age 32 at the time of conception were 30.88-32.38 years old when giving birth. Mothers over 32 at the time of conception were 32.77-34.27 years old when giving birth. Under32 × After (β_3) shows the effect of the restricted access to abortion of mothers under age 32 compared to mothers over age 32. Control variables: see Table 1.