



Estimating the Effect of Early-Childhood Citizenship on Education Using Policy Changes as Instruments

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Abstract

This paper investigates the effect of early-childhood citizenship status on secondary school education of immigrant offspring. Given the potential endogeneity of naturalization decision, I instrument for citizenship by using a German reform that introduced exogenous variation in the age of naturalization. The reform provides powerful instruments, significantly raising the likelihood of possessing a German passport in childhood. I find that citizenship status increases the probability of attending the highest school track, which gives access to academic education. The effects are of a similar magnitude for boys and girls.

Copyright statement

The usual disclaimer applies.

Author note

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1 Introduction and Background

Children of migrants represent a substantial and fast growing segment of many populations. Thus their successful integration, particularly through education receives increasing public attention. It is well established that immigrant offspring has on average worse educational outcomes than the native counterparts, which might be partly explained by disadvantaged parental background (e.g., Luthra and Soehl, 2015).

Little attention has been paid to institutional factors such as access to host country citizenship as a potential determinant of educational success.¹ Given that the fundamental attributes of citizenship such as political rights and access to restricted occupations are not yet relevant during childhood, the research commonly evaluates the returns to citizenship for adults (e.g., Bevelander and DeVoretz, 2008). Most recently, Gathmann and Keller (2017) show that a faster access to citizenship improves labor market outcomes of immigrants in Germany.²

However, citizenship status might also have important implications for children as according to the Human Skill Formation Model (Cunha and Heckman, 2007), early inputs should yield relatively high returns later in life. Parents might expect higher returns to a child's education if host country citizenship suppresses any labor market restrictions. Thus, the main economic mechanism through which citizenship might affect education are increased early parental investments into a child's quality (Avitabile et al., 2013, 2014). Nevertheless, less discrimination experienced in school might also be relevant for educational achievement (e.g., Lüdemann and Schwerdt, 2013). Overall, we expect favorable effects of host country citizenship on children's education. Empirically, the causal link remains underexplored, and its estimation is complicated by potential selection on unobserved factors.³

¹García-Pérez (2013) shows that citizenship correlates with children's health.

²As in many countries, German citizenship is required for specific jobs (e.g., in public sector or as lawyers), but the list of restricted professions is much longer compared to other countries (Gathmann and Keller, 2017). However, most of the restrictions do not apply to EU-citizens. Compared to the US, Germany is relatively generous in terms of eligibility for main welfare programs, which is independent of citizenship (Riphahn and Wunder, 2013). The access to education is also unrestricted (Avitabile et al., 2014).

³For example, parents eager to integrate are more likely to naturalize (themselves and their children). At the same time, we expect such parents to invest intensely in host country-specific human capital (e.g. language), which might improve their children's educational outcomes.

This paper deals with two core problems of the limited literature on socio-economic returns to citizenship: the adult-centered viewpoint and endogeneity. The identification relies on a German reform introduced on 01.01.2000. Its core element was introduction of birthright citizenship (*Jus soli*) for children of foreigners if at least one parent has been ordinary resident in Germany for at least eight years.⁴ Before the reform, a newborn was eligible for German citizenship only by the right of blood (*Jus sanguinis*), i.e., if at least one parent was a German citizen. The ineligible immigrant offspring could be naturalized later on if parents naturalized or if the child reached the age to apply itself. Beyond the birthright provision for children born from 01.01.2000 onwards, the reform included a transitory provision for children born between 1990-1999. They were retrospectively granted German citizenship if at least one parent fulfilled the residency requirement at childbirth and submitted a special application by 31.12.2000.

This paper explores the institutional changes as a source of exogenous variation in the age of becoming a German citizen to estimate the effect of early-childhood citizenship status on secondary school education. My two-stage-least-squares (2SLS) approach uses the new birthright and transitory provisions to address the endogeneity issue.⁵ The identification strategy allows me to study various birth cohorts, thereby yielding sufficient observations to investigate the effects by child gender.

2 Data and Methods

I pool cross-sectional data from three waves of Microcensus, which provides a large sample and rich background information on all household members. Given that the latest available survey year is 2014, I add the years 2011 and 2008 to observe the relevant birth cohorts at similar ages (between 14 to 16). Table A.1 in the Appendix summarizes the sample construction. My estimation sample comprises individuals born in Germany between 1992-2000 to at least one

⁴Details are provided by e.g., Avitabile et al. (2013, 2014).

⁵In contrast, two contemporaneous studies evaluate the effects of birthright provision on educational outcomes within a difference-in-difference framework. The report by Sajons and Clots-Figueras is available at <https://sites.google.com/site/christophsajonsresearch/home/research-1> [last accessed: 17.11.2017]. The other working paper is Felfe et al. (2016). Earlier Felfe and Saurer (2014) report partly different results. These studies compare children born several months before and after 01.01.2000, and do not account for the transitory provision to their control group born before the cutoff. Such approach might incorporate an identification problem.

migrant parent.⁶ A parent is defined as migrant if she/he was born abroad and migrated to Germany as a foreigner, or was born in Germany but as a foreign citizen.⁷ The final sample includes 8,665 West German children of migrants.⁸

The dependent variable is the probability that a child attends the highest track during secondary schooling, which is traditionally a tripartite system; after four grades of primary schooling, students are sorted into three school types.⁹ The lowest track (*Hauptschule*) and the middle track (*Realschule*) comprise 9 and 10 grades, respectively. They prepare for an apprenticeship or vocational training. The highest track (*Gymnasium*) of 12 or 13 grades gives access to academic education. Alternatively, comprehensive schools (*Gesamtschule*) facilitate preparation for the low and middle degree, but some include also the highest track. Nevertheless, the attendance at the classical *Gymnasium* is a common measure of educational success and a strong predictor of high future earnings. The key explanatory variable is an indicator for having a German citizenship. To avoid reverse causality¹⁰, I focus on citizenship before a child's school enrollment (typically at age 6).

Given the potential endogeneity of citizenship, I apply a 2SLS approach. The first-stage equation uses the institutional changes of 2000 as a source of exogenous variation in the probability of obtaining German citizenship:

$$\text{citz}_i = \text{reform}'_i\beta + \text{cohort}'_i\gamma + \text{m_mig}'_i\delta + \text{f_mig}'_i\eta + \text{p_ysm}'_i\theta + \mathbf{x}'_i\lambda + v_i, \quad (1)$$

where citz_i is an indicator that a child i had German citizenship before age 6. The set of in-

⁶I was unable to link about 1% of children to either parent. They are excluded but my sample includes children of single parents. All regressions include indicators for missing parents.

⁷My approach excludes Ethnic Germans arriving from the former German territories in Eastern Europe under privileged conditions.

⁸I exclude children living in East Germany (9%) to avoid the negative selection of cohorts born there after the fall of the Berlin Wall (Chevalier and Marie, 2017).

⁹Details are provided by e.g., Pischke (2007); Lüdemann and Schwerdt (2013). The specific tracking criteria differ by state. Usually, the primary school teacher makes a recommendation, which according to official guidelines should reflect solely a student's cognitive skills, with no consideration given to socioeconomic or migration background. In practice, some subjective teacher assessment is involved. In several states, the recommendation is not binding, but in practice, the vast majority of parents comply.

¹⁰For example, educational success might motivate or facilitate a naturalization. Reversely, parents might assign a child's poor school performance to discrimination, which could also increase the incentives to naturalize.

struments ($reform_i$) comprises six indicators of whether and when a child was affected by the reform. Specifically, children born in 2000 were treated at birth if one of the migrant parents fulfilled the residency requirement of eight years. Children born in 1999 were affected at the earliest at age 1 if the residency requirement was satisfied at childbirth and the application submitted in 2000 was handled immediately. By the same logic, those born 1998 were affected at the earliest at age 2, and so on. The last cohort that could benefit from the transitory rules before school enrollment was 1995. All instruments are interaction terms between a child's birth year ($cohort_i$), a mother's and a father's migrant status (m_mig_i and f_mig_i , respectively), and the maximum of parental years since migration (p_ysm_i) at birth. Their main effects are therefore included in all estimations. Importantly, the cohort fixed effects flexibly capture any potential trends such as changes in educational system or labor market developments, which might also affect track choices. Because sampled children are between 14 and 16 years old when interviewed, x_i controls for completed age in months (linear and squared). In extended specifications, x_i includes also other socio-demographic characteristics. All variables are described in Table A.2 in the Appendix.

The citizenship status predicted from equation 1 enters the main model

$$y_i = \alpha \text{citiz}_i + \text{cohort}'_i \mu + m_mig'_i \nu + f_mig'_i \phi + p_ysm'_i \varphi + x'_i \pi + \epsilon_i, \quad (2)$$

where α captures the effect of German citizenship on the probability of attending the highest track y_i . Equations 1 and 2 include identical control variables.

The key identification assumptions are the relevance and exogeneity of instruments. I test the relevance condition in next section. Exogeneity is fulfilled if the instruments are unrelated to ϵ_i in equation 2. The reform was unanticipated (Avitabile et al., 2014). Thus, the main threat is that the citizenship due to transitory rules was not automatic because parents needed to submit a special application. To mitigate the concern that the decision to apply depended on parental characteristics, I control for parental years since migration, age at birth, education, and country of origin. These covariates should to large extent capture the unobserved level of

parental integration and the aspirations regarding their children's education.

3 Results

I first investigate the reform's effect on the citizenship status. The results in Panel A of Table 1 demonstrate that the reform provides powerful instruments, significantly raising the probability of acquiring German citizenship before school enrollment. The effects are largest for children treated by the birthright provision but among those affected by the transitory rules until age 4, the effects are also statistically and economically significant. The insignificant estimates for age 5 are consistent with administratively postponed naturalizations.¹¹ The relatively constant estimates across the first three columns suggest that the reform was independent of background characteristics. This supports the validity of the instruments, regardless whether based on the automatic (age 0) or non-automatic citizenship provisions (ages 1-5). The F-statistics confirm the relevance of the instruments, also if the sample is split by gender in the last two columns.

The 2SLS estimates in Panel B suggest that German citizenship significantly increases the probability of attending the academic track by roughly 11 percentage points. For comparison, unconditional OLS regressions give a smaller coefficient of roughly 0.08, which after including the control variables, drops further to 0.03 (both highly significant). The 2SLS effect is similar for boys and girls, though less precisely estimated compared to the full sample. The results of the Sargan test for over-identifying restrictions in Panel C further support the validity of the instruments across all specifications.

Table A.3 documents that my findings are not driven by specific sample restrictions. To assess the potential issue of selective out-migration or leaving parental home, I re-estimate the first stage on Microcensus 2005. Further sensitivity tests include migrant children from East Germany, native children, and children born abroad into the analysis. The two latter groups serve as additional control groups unaffected by the reform. The extended samples yield even slightly larger and preciser effects in Panel B. The main result holds also if I change the age threshold for obtaining German citizenship to age 5. The expected benefits of German citizen-

¹¹Although submitted in 2000, most of the applications were verified not earlier than in 2001 (Worbs, 2008).

Table 1: Effect of citizenship at ages 0-6 on secondary school track (2SLS)

	All	All	All	Boys	Girls
A: Reform's effect on citizenship status (first stage)					
Affected at age 0	0.443*** (0.026)	0.447*** (0.026)	0.451*** (0.026)	0.439*** (0.037)	0.465*** (0.036)
1	0.125*** (0.031)	0.128*** (0.031)	0.127*** (0.030)	0.172*** (0.042)	0.085** (0.042)
2	0.137*** (0.031)	0.137*** (0.031)	0.134*** (0.030)	0.157*** (0.043)	0.111*** (0.042)
3	0.099*** (0.032)	0.095*** (0.031)	0.080*** (0.030)	0.104** (0.042)	0.063 (0.043)
4	0.083** (0.032)	0.088*** (0.032)	0.083*** (0.030)	0.148*** (0.042)	0.013 (0.043)
5	0.015 (0.033)	0.017 (0.033)	0.031 (0.031)	0.085* (0.044)	0.020 (0.043)
F-Statistic	52.52	53.04	54.01	24.32	31.31
B: Effect of citizenship on attending the highest track					
German citizenship	0.117* (0.070)	0.134* (0.069)	0.111* (0.065)	0.103 (0.091)	0.109 (0.089)
C: Sargan test for over-identifying restrictions					
Score $\chi^2(5)$	0.855	1.486	1.911	0.479	2.062
p-value	0.973	0.915	0.861	0.993	0.841
Child characteristics		x	x	x	x
Parental characteristics			x	x	x
Observations	8,665	8,665	8,665	4,477	4,188

Baseline covariates and a constant included throughout. All variables described in Table A.2.

F-statistics for a joint significance tests of instruments. Robust standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

ship on the labor market are larger for non-EU compared to EU citizens, who anyway enjoy unlimited geographical and occupational mobility within the EU. Thus, I also test whether their educational choices respond differently to German citizenship. The sample split yields insignificant effects, but their magnitude is fairly similar. Finally, I exclude children born 2000, to test whether my results are entirely driven by the birthright citizenship procedure. The first-stage coefficients remain very stable, but the F-Statistic is below the conventional threshold of 10. Nevertheless, although it lacks significance due the reduced sample size, the magnitude of the effect in Panel B still underpins my main conclusion.

4 Conclusions

This paper contributes new quasi-experimental evidence to the limited research on the effect of host country citizenship on migrants' education. The identification relies on a German reform that introduced exogenous variation in the age of naturalization. The results of 2SLS estimations reveal that early-childhood citizenship significantly affects the probability of attending the most advanced track in secondary school, which is a common measure of educational achievement and a strong predictor of future earnings.

This paper supports the conjecture that a liberalized access to German citizenship helps the immigrant offspring to catch up with the native counterparts in terms of educational success, which partly motivated the German reform. However, given that the law changes were very specific, it is difficult to extrapolate the finding to other institutional and cultural contexts. Nevertheless, this paper also calls for further research on other channels through which citizenship might be a prerequisite for full political, social, and economic integration.

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Appendix

Table A.1: Sample construction

Birth cohort	Microcensus year		
	2008	2011	2014
1992	Age 16		
1993	Age 15		
1994	Age 14		
1995		Age 16	
1996		Age 15	
1997		Age 14	
1998			Age 16
1999			Age 15
2000			Age 14

Table A.2: Sample means

Baseline variables	mean (sd)	Additional controls	mean (sd)
Child's secondary school track		<i>Child characteristics</i>	
high	0.271	Male	0.517
middle	0.307	Birth order: 1st	0.515
low	0.233	2nd	0.352
other	0.190	3rd	0.103
Citizenship at ages 0-6	0.608	4th and higher	0.030
Reform indicators: affected at age		Twin	0.026
0	0.069	State: Schleswig-Holstein	0.026
1	0.063	Hamburg	0.030
2	0.064	Lower Saxony	0.087
3	0.060	Bremen	0.012
4	0.057	North Rhine-Westphalia	0.307
5	0.051	Hesse	0.115
<i>Covariates</i>		Rhineland-Palatinate	0.049
Birth year	1996.219 (2.575)	Baden-Württemberg	0.206
Mother's migration status		Bavaria	0.158
non-migrant	0.131	Saarland	0.011
migrant	0.854	<i>Parental characteristics</i>	
n/a; missing mother	0.015	Mother's education: low	0.349
Father's migration status		middle	0.205
non-migrant	0.125	high	0.203
migrant	0.725	no degree	0.189
n/a; missing father	0.149	other/missing	0.039
Parental years since migration		missing mother	0.015
0-7	0.224	Father's education: low	0.351
8-14	0.158	middle	0.144
15 and more	0.260	high	0.200
n/a; mother born in Germany	0.130	no degree	0.123
n/a; father born in Germany	0.174	other/missing	0.032
n/a; both born in Germany	0.055	missing father	0.149
Age at interview (in months)	180.672 (10.931)	Mother's age at birth	27.537 (5.518)
		Father's age at birth	30.985 (6.513)
		Country of origin: Turkey	0.349
		EU-15	0.191
		new EU-13	0.088
		remaining Europe	0.113
		Other	0.259
Observations	8,665		

Birth year enters the regressions as eight indicators for years 1993 through 2000 (1992 is the reference). A child's and parental age is included linearly and squared. Parental age at birth is coded as zero for missing parents.

Table A.3: Alternative specifications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Microcensus 2005	incl. East Germany	incl. natives	incl. born abroad	ages 0-5	non-EU	EU-15	born before 2000
A: Reform's effect on citizenship status (first stage)								
Affected at age 0	0.412*** (0.026)	0.430*** (0.025)	0.466*** (0.019)	0.437*** (0.023)	0.456*** (0.025)	0.414*** (0.030)	0.492*** (0.066)	- -
1	0.143*** (0.029)	0.127*** (0.028)	0.150*** (0.023)	0.126*** (0.027)	0.124*** (0.029)	0.120*** (0.033)	0.024 (0.060)	0.133*** (0.030)
2	0.184*** (0.029)	0.114*** (0.029)	0.134*** (0.023)	0.125*** (0.027)	0.135*** (0.029)	0.102*** (0.034)	0.096 (0.066)	0.140*** (0.030)
3	0.073*** (0.024)	0.064** (0.029)	0.097*** (0.023)	0.085*** (0.027)	0.081*** (0.029)	0.057* (0.035)	0.117** (0.057)	0.086*** (0.030)
4	0.101*** (0.025)	0.079*** (0.029)	0.062*** (0.023)	0.082*** (0.027)	0.082*** (0.029)	0.052 (0.034)	0.109* (0.062)	0.090*** (0.030)
5	0.067*** (0.026)	0.035 (0.030)	0.016 (0.024)	0.028 (0.028)	- -	0.011 (0.036)	0.077 (0.054)	0.039 (0.031)
F-Statistic	42.77	53.24	106.27	61.01	68.52	35.82	9.65	7.50
B: Effect of citizenship on attending the highest track								
	-	0.133** (0.066)	0.122*** (0.043)	0.137** (0.059)	0.104* (0.063)	0.103 (0.077)	0.091 (0.146)	0.121 (0.167)
C: Sargan test for over-identifying restrictions								
Score $\chi^2(5)$	-	1.303	3.497	2.926	0.737	2.607	4.164	1.693
p-value	-	0.935	0.624	0.711	0.943	0.760	0.526	0.792
Child & parental characteristics	x	x	x	x	x	x	x	x
Observations	9,287	9,454	45,070	10,370	8,665	7,006	1,659	7,555

Baseline covariates and a constant included throughout. All variables described in Table A.2. F-statistics for a joint significance tests of instruments. Robust standard errors in parentheses.

* p<0.10, ** p<0.05, *** p<0.01.