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Heterogeneous responses to school track choice: Evidence from the repeal of binding track recommendations

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ABSTRACT

This paper studies how introducing free school track choice in Germany's between-school tracking system through a repeal of binding track recommendations affects track decisions by socio-economic status (SES). While highest track enrollment increases for previously ineligible high-SES students relative to comparable low-SES students, the SES gap does not increase. This is because previously eligible low-SES student become more likely to enroll in the highest track. A key mechanism for this response appears to be lower preferences for the intermediate track due to concerns about the inflow of mostly low-achieving and low-SES students from the lowest track after the repeal.

1. Introduction

Most OECD countries sort students into hierarchically ordered secondary school types which provide access to different postsecondary schooling and occupational career paths (e.g., access to university) (OECD, 2013). In these between-school tracking systems, students from more disadvantaged families often attend less demanding school types (henceforth tracks) compared to children from more advantaged backgrounds with similar measures of prior academic achievement.[2] These social differences in higher track attendance potentially reinforce educational inequality and prevent social mobility.[3]

Track admission rules could play an important role in these observed educational inequalities. A key policy question is whether admission to more demanding tracks should be conditional on prior achievement or unrestricted. Due to potential social differences in educational aspirations, a common concern with free track choice is a widening of the gap in higher track attendance by socio-economic status (SES)[4]: higher-SES parents might be more likely to choose a higher track for their child, irrespective of ability, relative to lower-SES parents when admission is not conditional on prior achievement.

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[2] See, for example, Guyon and Huillery (2020) for evidence for France, Dumont et al. (2014) for a review of studies for Germany, and Carlana et al. (2022) for Italy.

[3] These effects can be expected despite the fact that Dustmann et al. (2017) find no detrimental effect of a lower track placement on the long-term labor market outcomes for students at the margin between two tracks in the German context. They identify a local average treatment effect for students induced to attend the next higher track due to being older at school entry. It is unclear how informative this effect is for the population of inframarginal and mostly low-SES students, whose higher track enrollment is not impaired by failure of being admitted but because of lower educational aspirations (i.e. non-compliers in Dustmann et al. (2017)'s instrumental-variable design). These lower educational aspirations are also likely to result in less track upgrading later on, which (Dustmann et al., 2017) argue is crucial for the limited importance of initial track placements for marginal students. For evidence that early tracking in Germany affects students at the margin between two tracks differently than inframarginal students, see Roller and Steinberg (2020) and Matthewes (2020).

[4] See, for example, Ambler (1994), Checchi and Flabbi (2007), Jackson and Jonsson (2013).

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This paper addresses this concern by studying whether introducing free track choice makes track decisions more dependent on social background. The context is Germany's early between-school tracking system, where children as young as 10 years old are sorted into different hierarchically ordered school tracks at the end of primary school. Specifically, I investigate the effects of abolishing binding track recommendations on track decisions. Binding track recommendations are based on student performance in the last grade of primary school and put an upper limit on track choice—students cannot attend a higher track than recommended but can always enroll in lower tracks.

The first part begins with a case study of the federal state Baden-Württemberg which repealed binding track recommendations in 2012. The cohort transitioning to secondary school in that year was the first free to choose between the basic, intermediate, and academic track, regardless of the type of track recommendation. Based on county-level data for the universe of track transitions in Baden-Württemberg, I document that transitions into the highest (academic) school track evolve smoothly prior to the repeal. When the repeal goes into effect, transitions into the academic track increase sharply and by roughly the same proportion across counties with very different average SES (as measured by the share of the adult population that holds an academic track qualification). In other words, free track choice did not widen the gap in academic track enrollment between higher- and lower-SES counties. However, this result masks disparate responses across counties at the two margins that students might find themselves at: students *without* an academic track recommendation – who would have been ineligible prior to the repeal – are much more likely to enroll in the academic track after the repeal in higher-SES counties compared to lower-SES counties. But this does not increase the academic track enrollment gap because students in lower-SES counties *with* a recommendation for the academic track – who were already eligible pre-repeal but often enrolled in the intermediate track instead – become more likely to comply with an academic track recommendation.

I replicate these results using student-level data from the National Assessment Study (NAS), which surveyed state-representative samples of around 25,000 fourth grade students, as well as their parents and teachers, across all German federal states in 2011 (pre-repeal) and 2016 (post-repeal). This allows to include the federal state Saxony-Anhalt in the analysis, which also repealed binding track recommendations in 2012. I draw on other federal states, which did not change track admission rules, as a comparison group in a difference-in-differences design (DiD). Thus, I identify the effect of repealing binding track recommendations from relative changes between repeal and no-repeal states, pre- and post-repeal. Classifying students as high- and low-SES by whether or not they have at least one parent with an academic track qualification, I again find that the SES gap in academic track enrollment does not widen after the repeal. Looking at transitions conditional on track recommendations reveals similar patterns as the county-level analysis: high-SES students without an academic track recommendation are 19.4 percentage points (p.p.) more likely to enroll in the academic track after the repeal, while low-SES students without an academic track recommendation increase their academic track enrollment only by 7.8 p.p. At the other margin, low-SES students with an academic track recommendation become 12.3 p.p. more likely to enroll in the academic track after the repeal. There is no corresponding change for high-SES students. Tracing out effects across the achievement distribution (measured by standardized test scores) confirms the asymmetry in responses across SES: low-achieving, high-SES students increase their academic track enrollment relative to comparable low-SES students. The reverse is true for average achieving, low-SES students relative to comparable high-SES students.

The second part explores potential mechanisms for the surprising finding that low-SES students with an academic track recommendation increasingly enroll in the academic track after the repeal despite the fact that their choice set did not expand. There is no evidence that this effect results from compositional changes. For instance, due to low-SES students becoming relatively less disadvantaged over time, or positive selection into the group of students with an academic track recommendation as a result of stricter grading requirements after the repeal. The effect is also not mechanical because of intermediate track schools becoming oversubscribed after the repeal. This supports a behavioral response interpretation: low-SES students who would not choose the academic track, despite being eligible, when track choice is restricted, do so when track choice is free.

Further analyses suggest that this response to free track choice is, to a large extent, the result of concerns about the inflow of previously ineligible students into the intermediate track. Evidence for this explanation comes from the finding that responses differ by whether or not free track choice is predicted to result in increased intermediate track enrollment of students with only a basic track recommendation. Specifically, I show that in settings where the basic and intermediate track are combined within a single comprehensive track (i.e. where a shift of students from the basic into the intermediate track is ruled out), free track choice has no or only a small effect on low-SES students' compliance with academic track recommendations.

This study is related to several strands of literature. The first comprises research on factors affecting educational decisions and socio-economic gaps in educational attainment. Most economic research in this area has looked at college enrollment decisions and degree completion (e.g., Bailey & Dynarski, 2011). In between-school tracking systems, where postsecondary education opportunities strongly depend on the secondary school track, consequential schooling decisions are made relatively earlier and to a much larger extent by parents. The theoretical literature on SES gaps in schooling decisions has emphasized the importance of educational aspirations in these contexts (Dalton et al., 2016; Genicot & Ray, 2017; Mookherjee et al., 2008). My contribution to this literature is twofold. First, the finding that academic track enrollment of previously ineligible students rises relatively more for high-SES compared to low-SES students under free track choice, provides causal revealed preference evidence for the role of social differences in educational aspirations as an explanation for educational attainment differences. Second, my results contribute to the literature by drawing attention to the malleability of disadvantaged households' schooling decisions. Low-SES students' increased compliance with academic track recommendations due to concerns about an inflow of low-achieving students into the intermediate track suggests the sensitivity of their schooling decisions to contextual factors.

This article also adds to the academic debate around school choice and its implications for educational segregation. Most work by economists has analyzed the effects of increased school choice (e.g., through voucher programs or charter schools) in comprehensive school systems where school choice is typically restricted by place of residence due to school catchment areas (see Burgess & Greaves, 2021, for an overview).[5] Overall, the evidence for comprehensive school systems points towards more student sorting by ability or parental background when choice increases. In contrast, households in between-school tracking systems are generally free to choose any school as long as students qualify for the specific track offered at the school (i.e. there are no catchment areas). As a consequence, educational segregation in these systems is highest across school types and not across individual schools of a given type (see, e.g., Oosterbeek et al., 2021). I contribute to the literature on school choice by demonstrating that increased choice in between-school tracking systems does not necessarily result in more educational segregation by family background. Inequality exacerbating

[5] See, for example, Brunner et al. (2010); (Chakrabarti, 2013; Figlio et al., 2010; Marcotte & Dalane, 2019; Monarrez et al., 2022) for evidence for the US, Söderström and Uusitalo (2010); (Böhlmark et al., 2016) for Sweden, Hsieh and Urquiola (2006) for Chile, Lucas and Mbiti (2012) for Kenya, and Gortazar et al. (2020) for Spain.

responses of high-SES households to increased school choice are potentially offset by general equilibrium responses of low-SES households for whom choice does not increase.

More narrowly, this article contributes to an expansive literature on the effects of free track choice on track decisions. The topic has been extensively studied, particularly in the German context, and primarily by sociologist. Previous work has reached conflicting conclusions about the effect of free track choice on the SES gap in academic track enrollment with effects ranging from positive to negative (see, e.g., Büchler, 2016; Dollmann, 2011; Esser & Hoenig, 2018; Gresch et al., 2010; Grewenig, 2021; Jähnen & Helbig, 2015; Neugebauer, 2010; Osikominu et al., 2021; Roth & Siegert, 2015, 2016).[6] My study potentially solves a key puzzle in this literature which has eluded explanations thus far: high-SES parents generally report higher track aspirations for their children than low-SES parents conditional on prior academic achievement (see, e.g. Ditton, 2007; Paulus & Blossfeld, 2007). This is difficult to reconcile with the ambiguous evidence on the effects of free track choice on the SES gap in academic track enrollment from previous studies. The tendency of eligible low-SES students to increase their academic track enrollment in response to free track choice could explain why an increase in academic track enrollment of previously ineligible high-SES students does not widen the SES gap in academic track enrollment.[7] As I show that responses to free track choice also depend on the structure of the tracking system further helps to explain why previous studies potentially reach such different results.

2. Institutional context

This section gives a concise description of the German school system with a focus on those aspects that are most relevant for understanding the transition from primary to secondary school.

Fig. 1 provides a stylized overview of primary and secondary education in Germany. Primary school covers grades 1 through 4, or in some federal states grades 1 to 6, and assignment is based on whether a student lives within a school's catchment area. At the end of primary school, students are allocated to different, hierarchically ordered school types, which I will refer to as school tracks. There are two types of tracking systems in Germany. The first is a 3-tiered system with *Hauptschule*, *Realschule*, and *Gymnasium*. I label these tracks 'basic', 'intermediate', and 'academic', respectively. These school tracks have different curricula and school-leaving qualifications. The basic and intermediate school-leaving qualifications qualify students for vocational education, whereas the qualification from the academic track (*Abitur*) is the formal prerequisite for university enrollment. Education in the academic track lasts eight to nine years (grades 5-12/13), whereas the basic and intermediate track lasts five (grades 5–9) and six years (grades 5–10), respectively. The second system is a 2-tiered system, where the basic and intermediate track are combined into one comprehensive school. In grades 5 and 6, students in comprehensive schools are not grouped by ability. However, some comprehensive schools form track-specific classes from grade 7 onward and offer the same school-leaving qualifications as the basic, intermediate, and academic track schools.

The rules governing which track children can attend after primary school differ across states and have undergone sharp changes in the last decade. However, the basic structure is the same across states. In contrast to primary school, there are no catchment areas. There are also no formal exit exams at the end of primary school. Instead, the primary school issues a secondary school track recommendation for each student which is generally guided by the student's abilities and their performance in the last grade of primary school.[8] The main difference between states is whether this recommendation is binding or not. While in some states students cannot attend a higher track than recommended.[9] other states allow parents to freely choose a secondary school track for their child regardless of the recommendation. However, parents can always opt for a lower track than recommended, even in states with binding track recommendations. Table 1 shows which states had binding track recommendations for the school years 2011/11-2016/17. In 6 out of 16 states, the school's recommendation was binding in 2011. Of these 6 states, Baden-Württemberg and Saxony-Anhalt repealed binding track recommendations in 2012.

3. Data

The empirical analysis is based on two main data sets: administrative school records from the state of Baden-Württemberg and survey and standardized test score data from the National Assessment Study (NAS). I describe each data set in turn.

3.1. Administrative school records

I obtained data on all transitions from primary school to each secondary school track by track recommendation at the county level for the school years 2005/06 to 2016/17 for the state Baden-Württemberg. These data are collected by the statistical office of Baden-Württemberg.[10] To these data I merge the fraction of the adult population (aged 30–59) with an academic track qualification at the county level based on data from the 2011 German Census. Table A.1 in the appendix provides descriptive statistics for the pre-repeal (2005–2011) and the post-repeal (2012–2016) period for these data.

3.2. National Assessment Study (NAS)

To investigate effects at the individual-student level, I use data from the National Assessment Study (NAS), which is designed to produce representative test score and survey data for all 16 German federal

[6] Most are observational studies relying on between-state comparisons, limiting causal interpretations due to potential confounding by other differences across states (Büchler, 2016; Esser & Hoenig, 2018; Gresch et al., 2010; Neugebauer, 2010). In contrast, Dollmann (2011), Grewenig (2021), Jähnen and Helbig (2015), Osikominu et al. (2021), Roth and Siegert (2015, 2016) exploit changes in track recommendation rules over time differencing out state fixed effects. Except for (Dollmann, 2011) and Osikominu et al. (2021), none of the quasi-experimental studies find an increase in the SES gap in response to free track choice. Since the quasi-experimental studies lack data on students' track recommendation, they are unable to investigate heterogeneous responses by SES and type of recommendation, which is needed to uncover and understand the different responses to free track choice documented in this paper.

[7] Gresch et al. (2010) also find that low-SES students with an academic track recommendation are less likely to enroll in the academic track in binding relative to nonbinding states (Gresch et al., 2010, Figure 1). But since their finding is based on a between-state comparison, they do not interpret it causally. Instead, they attribute it to other potential differences between states (e.g., institutional or population-wise). I show that this effect is not an artifact of between-state differences, but causally associated with the track recommendation regime.

[8] The factors determining recommendations differ across states. Bavaria and Saxony, for example, have specific GPA cutoffs, while other states do not specify the exact requirements to get a recommendation for a particular school. For more details on these rules see Helbig and Nikolai (2015). For a discussion of the factors teachers consider for their recommendations see Baumert et al. (2010).

[9] In case of conflict between the recommendation and the parents' wishes, some states allow students to take a special test whose outcome determines whether a student is allowed to attend the higher track.

[10] These data are not available for the other repeal state Saxony-Anhalt. Even if they were available, there is little variation in educational levels across Saxony-Anhalt's 14 counties, making it difficult to study responses by SES with only county level data in this state.

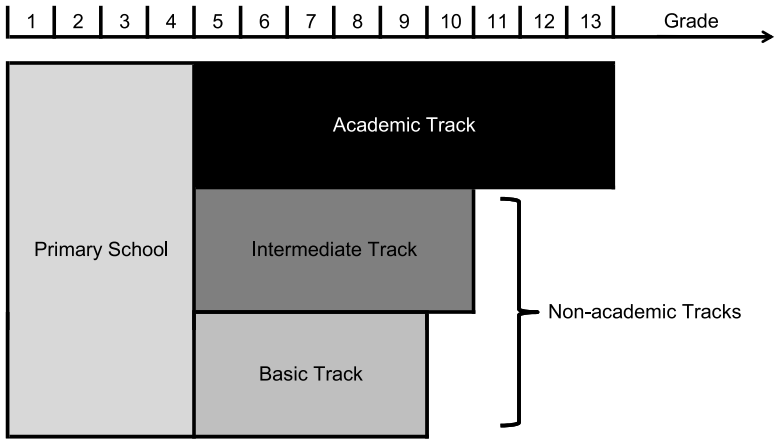

Fig. 1. Schematic overview of the tracking system in Germany. *Notes:* Academic track = *Gymnasium*, Intermediate track = *Realschule*, Basic track = *Hauptschule*. *Source:* Figure adapted from Matthewes (2020).

Table 1
Binding track recommendations at the end of primary school.
Source: State-specific school laws and www.kmk.org.

School year	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Schleswig-Holstein (SH)						
Hamburg (HH)						
Lower Saxony (NI)						
Bremen (HB)						
North Rhine-Westphalia (NW)						
Hesse (HE)						
Rhineland-Palatinate (RP)						
Baden-Württemberg (BW)	✓					
Bavaria (BY)	✓	✓	✓	✓	✓	✓
Saarland (SL)						
Berlin (BE)						
Brandenburg (BB)	✓	✓	✓	✓	✓	✓
Mecklenburg-Vorpommern (MV)						
Saxony (SN)	✓	✓	✓	✓	✓	✓
Saxony-Anhalt (ST)	✓					
Thuringia (TH)	✓	✓	✓	✓	✓	✓

Notes: The checkmark (✓) indicates that the school's recommendation for a secondary school track was binding in the respective school year.

states.[11] It is a repeated cross-section and was administered in 2011 and 2016, testing students at the end of grade 4 (between May and July) in math and German (reading and listening). Tests were administered by external staff to around 25,000 students in both years, with each state roughly contributing a similar number of students. Around 2600 schools participated in both waves combined. In each wave, random samples of schools were drawn at the federal state level, and within each school, one class was randomly selected for testing. I use these test scores to study effects across the achievement distribution. Following the education literature, I compute percentile ranks for each state and cohort of an achievement index (AI) created from the average standardized math, reading, and hearing test scores.

In addition to test score data, the NAS includes information collected through surveys of the participating students, their parents, teachers and school principals. While participation in the competence tests was mandatory in all sampled classes in public schools, completion of the student questionnaire was mandatory only in some states, and participation in the parent questionnaire was voluntary in all states. As a result, participation rates for the student and parent questionnaire (83% and 74%, respectively) are considerably lower than test participation, which is 98% and 94% for waves 2011 and 2016, respectively.

Information on students' track recommendation comes from school records.[12] Information on school track choice comes from the parent survey. As the registration period for secondary school typically ends in March, this information should closely correspond with eventual track attendance.

As a measure of the socio-economic background of students, I classify students by parental education. Since the focus is on inequalities in secondary school track choice, a natural classification is whether at least one parent has an academic track qualification (*Abitur*). I will refer to students with at least one parent with an academic track qualification as high-SES, and students where neither parent has an academic track qualification as low-SES. Choosing this classification has several advantages. First, it allows for consistency across the aggregate county-level and the students-level analysis. While the student-level NAS data includes various socioeconomic characteristics of parents (e.g., household income, occupational prestige, immigration background), some of these measures are not available at the county level (e.g., occupational prestige). Second, children's educational attainment in Germany differs strongest by parental education, and not by household income or between native and migrant groups.[13]

[11] For more details on the NAS data, see Stanat et al. (2012, 2017).

[12] Students generally receive their track recommendation with their mid-term reports in January and the NAS survey was conducted between May and July of the same school year.

[13] For instance, the fraction of children obtaining an academic track qualification is roughly similar for children from parents without an academic

Table 2
Descriptive statistics by SES, 2011 and 2016, repeal and no-repeal states.
Source: Own calculations based on NAS waves 2011 and 2016.

	High-SES				Low-SES				Triple difference
	Repeal states		No-repeal states		Repeal states		No-repeal states		
	2011	2016	2011	2016	2011	2016	2011	2016	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Academic track enrollment	0.71	0.75	0.71	0.70	0.30	0.36	0.30	0.31	0.00
Academic track recommendation	0.75	0.71	0.70	0.70	0.40	0.38	0.33	0.37	0.02
Migration background	0.23	0.28	0.23	0.25	0.33	0.37	0.28	0.29	0.00
German spoken at home	0.87	0.78	0.86	0.79	0.81	0.74	0.83	0.76	−0.02
Parents' highest years of education	17.25	17.19	17.20	17.07	12.92	13.26	12.89	13.26	0.01
Parents' highest ISEI	54.60	65.75	52.59	65.12	32.33	42.13	32.97	40.76	−3.39
N	860	877	3255	3101	3,053	930	952	3015	19,123
	Repeal states		No-repeal states						
	2011	2016	2011	2016					
Share high-SES	0.48	0.45	0.42	0.44					

Notes: This table provides descriptive statistics for the NAS sample. Repeal states are Baden-Württemberg and Saxony-Anhalt. High-SES students are those with at least one parent with an academic track qualification. Low-SES students are those without a parent with an academic track qualification. Column 9 reports the triple difference [(2) − (1) − ((4) − (3))] − [(6) − (5) − ((8) − (7))].

3.3. Sample selection

The analytic sample from the NAS data has to be restricted in three ways. First, I to drop all observations for which the following key variables are missing: test scores, parental education, track recommendation, and track choice. This applies to 43.3% of the original sample. I keep all observations with missing values for non-essential control variables such as gender, migration background, German spoken at home, and parents' Highest International Socio-Economic Index of Occupation Status (HISEI, Ganzeboom et al., 1992).[14] Second, since for the states Schleswig-Holstein, Lower-Saxony, and Bremen track recommendation information is missing for the majority of students for the 2016 wave, I exclude these states from the difference-in-difference analysis, which compares track decisions between the 2011 and 2016 wave. However, I keep these states for analyses which only use the 2011 NAS wave. Third, I have to exclude the states Berlin, Brandenburg, and Mecklenburg-Western Pomerania because transitions to secondary school take place after grade 6 in these states (instead of grade 4). Hence, track recommendation and track choice cannot be observed for these states in the NAS data. The number of states in my main estimation sample is therefore 10.

Table 2 reports descriptive statistics for the analytic sample by SES, repeal status, and year. It is worth noting that the share of students with a migration background increased in repeal states relative to non-repeal states after the repeal. Therefore, to ensure that my results are not driven by differential changes in the student composition across repeal and no-repeal states, I will check the student-level results' sensitivity to the inclusion of several family background characteristics. Appendix Tables A.2 and A.3 further report how my analytic sample, which is restricted to students whose parents filled out the voluntary parent questionnaire, differs from the representative, full NAS sample. While my estimation sample is positively selected in terms of track recommendation, German as a first language, grades, and test scores, selection into the estimation sample does not differ by repeal status or over time.[15]

4. Results

4.1. Baden-Württemberg case study

My analysis begins with changes in transitions into the academic track by socio-economic background across the 44 counties in Baden-Württemberg in response to the repeal of binding track recommendation.[16] I split the balanced panel of counties into four SES quartiles based on their share of the adult population with an academic track qualification. Fig. 2 illustrates this source of variation. The share of the adult population with an academic track qualification ranges from 15% (*Neckar–Odenwald–Kreis*) to 55% (*Heidelberg*) across all counties in Baden-Württemberg.

Prior to the repeal there are clear level differences in academic track transitions between quartiles with a substantially higher share of students attending the academic track in higher-SES counties. Fig. 3, Panel (a), shows the evolution of transitions into the academic track by SES quartiles. In 2011, the last year prior to the repeal, around 50% of students in the top quartile entered the academic track compared to only 35% in the bottom quartile.

Yet there is no evidence that academic track transitions changed differentially in higher- and lower-SES counties after the repeal. To allow for an easier comparison of the changes and to account for the fact that quartiles exhibit different trends prior to the repeal, Panel (b) plots transition rates for the top and bottom quartile that have been

track qualification in the top decile of the household income distribution and children of parents where at least one parents has an academic track qualification in the bottom decile of the household income distribution (Dodin et al., 2021, Figure 2). Educational inequalities between native and migrant students in Germany stem mostly from the lower socioeconomic status of migrant families rather than their migration background (for a summary of the evidence, see Siegert & Olszenka, 2016).

[14] Missing values for these control variables are dealt with in following way: I create separate missing categories for all categorical variables (e.g., migration background). Missing values for the continuous HISEI variable are imputed by linear predictions based on parents' years of education.

[15] Information on students' track recommendation, first language, and school grades comes from school records and is thus not conditional on teacher and parents' voluntary survey participation.

[16] There are two margins that can by analyzed in Baden-Württemberg: the basic versus non-basic track margin and the non-academic versus academic track margin. I focus here on the latter for two reason. First, this is the margin that matters most for postsecondary education as the academic track school-leaving qualification is a prerequisite for university enrollment. Second, the student-level analysis below, which combines 2-tiered and 3-tiered tracking system, is restricted to the academic versus non-academic track margin because both non-academic tracks are combined within comprehensive schools in 2-tiered tracking systems. For consistency, I therefore focus on the non-academic versus academic track margin in the county-level analysis. Results for the basic track margin are reported in the Appendix (Figures A.3 and A.4).

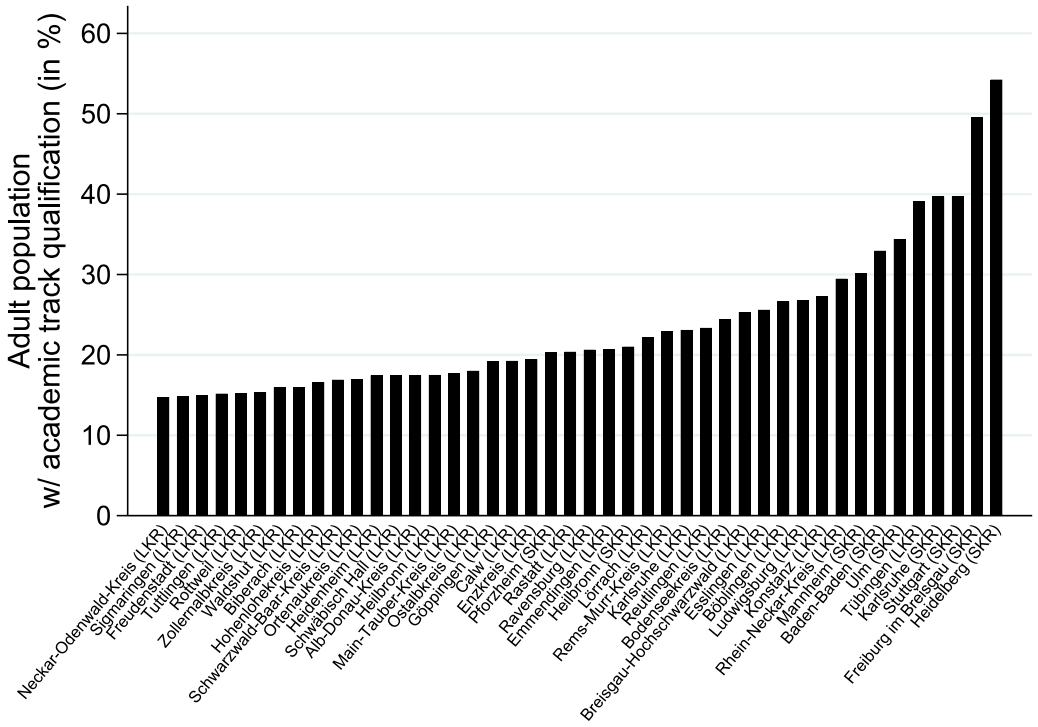

Fig. 2. Variation in educational background across counties.
Notes: The figure plots the share of the adult population (age 30–59) with an academic track qualification for each county in Baden-Württemberg.
Source: Own calculation based on data from the 2011 German Census: https://ergebnisse2011.zensus2022.de/datenbank//online?operation=table&code=2000S-3070&bypass=true&levelindex=0&levelid=1632990924660#abreadcrumb (Retrieved: 01/18/2021).

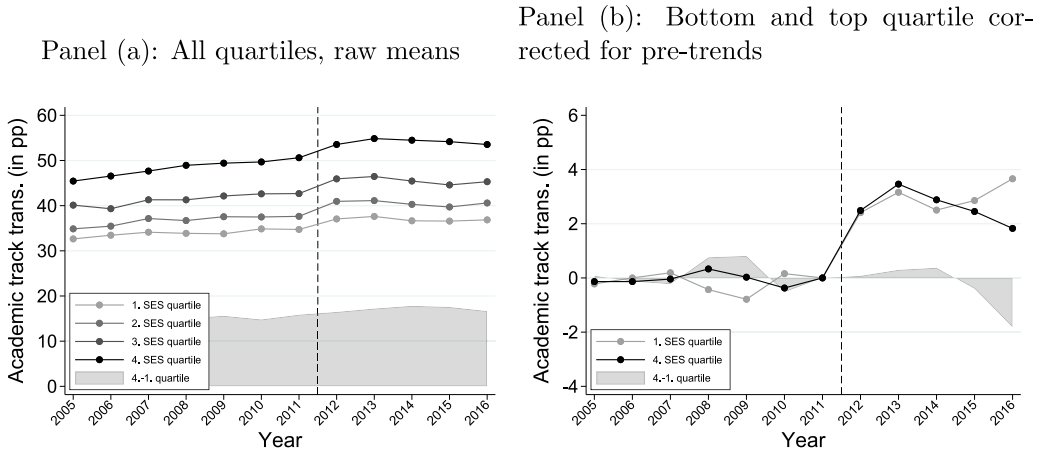

Fig. 3. Academic track transitions by SES quartiles.
Notes: Panel (a) plots transition rates into the academic track for all counties in Baden-Württemberg by quartiles based on the share of the adult population with an academic track qualification within a county. Panel (b) plots transition rates for the bottom and top quartile normalized to 2011 levels and corrected for pre-trends estimated over the period 2005–2011. The gray area plots the difference between the top and bottom quartile.
Source: Own calculations based on data from the Statistical Office of Baden-Württemberg.

(i) normalized to 2011 levels and (ii) corrected for quartile-specific trends estimated over the pre-repeal period (2005–2011). The gray area shows the top-bottom quartile gap. The bottom and top quartile regions experience similar increases in the year the repeal goes into effect. Academic track transitions sharply shift upwards and permanently remain 2 to 4 p.p. above their pre-repeal levels in subsequent years. If at all, the relative increase in academic track enrollment is larger for the bottom quartile, given its lower academic track transition rates prior to the repeal.

Differences in academic track enrollment, however, can result from different track decisions at two margins as the following basic decomposition of the probability to enroll in the academic track illustrates:

$$\begin{aligned} P(track = A) &= P(track = A, rec. = A) + P(track = A, rec. \neq A) \\ &= (1 - \underbrace{P(track \neq A | rec. = A)}_{\text{Downward non-compliance}}) P(rec. = A) \\ &\quad + \underbrace{P(track = A | rec. \neq A)}_{\text{Upward non-compliance}} P(track \neq A) \end{aligned} \tag{1}$$

Differences in academic track enrollment between SES groups can be attributed to differences in the probability to be recommended for the academic track or two types of non-compliance with track

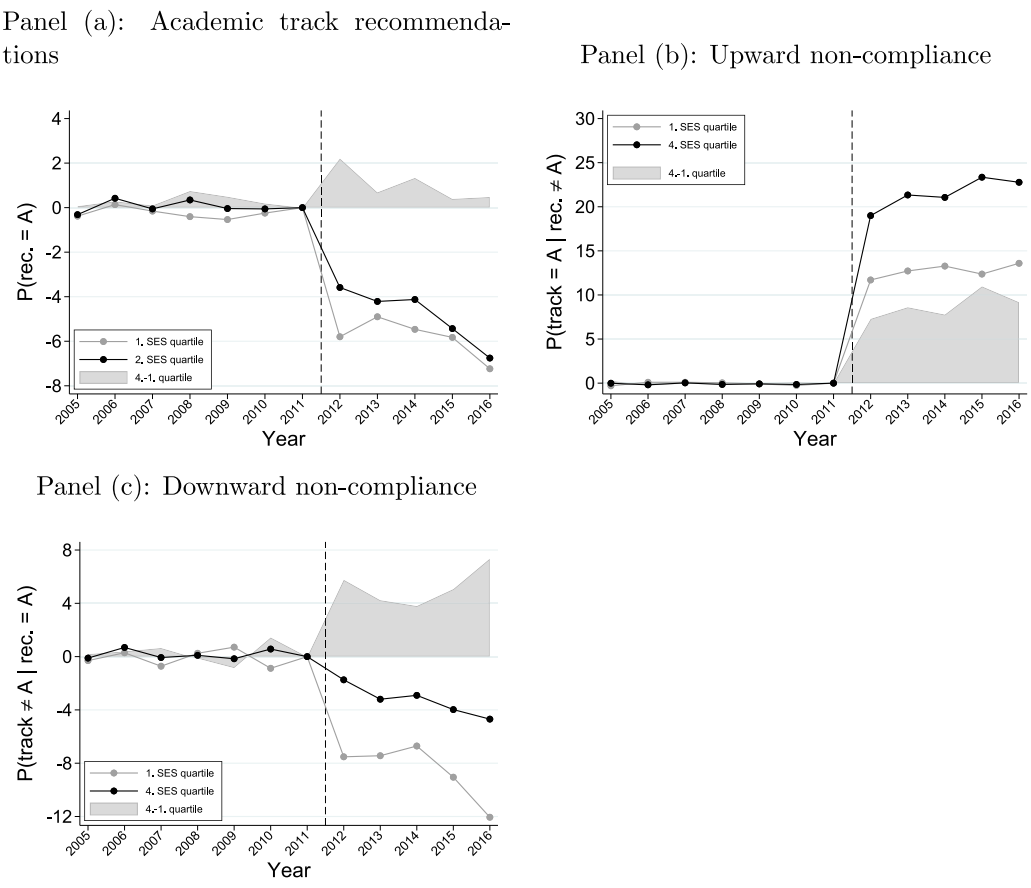

Fig. 4. Evolution of academic track recommendations, upward non-compliance, and downward non-compliance by SES quartiles.
Notes: All times series in this figure have been normalized to 2011 levels and corrected for quartile-specific pre-trends estimated over the period 2005–2011. Gray areas plot the difference between the top and bottom quartile. SES quartiles are obtained by grouping all counties of Baden-Württemberg into quartiles based on the share of the adult population with an academic track qualification within a county. Panel (a) plots the share of academic track recommendations. Panel (b) plots transitions rates into the academic track for students without academic track recommendations. Panel (c) plots transitions rates into the non-academic tracks for students with academic track recommendations.
Source: Own calculations based on data from the Statistical Office of Baden-Württemberg.

recommendations: enrolling in the academic track without an academic track recommendation (*upward non-compliance*) and enrolling in a non-academic track given a recommendation for the academic track (*downward non-compliance*). Concerns that free track choice widens SES gaps in academic track enrollment is mainly based on the fact free track choice allows for upward non-compliance, which is expected to be higher among high-SES parents due to social differences in educational aspirations.

Fig. 4 shows that the unchanged SES gap in academic track enrollment after the repeal results from different responses in low- and high-SES counties at the two non-compliance margins. It plots the evolution of all three factors (normalized to 2011 and detrended) that determine academic track enrollment for the bottom and top quartile. Raw time series for all quartiles are presented in Figure A.1 in the appendix.

First, Panel (a) shows that the top-bottom quartile gap in academic track recommendations remains roughly unchanged after the repeal. However, there is a general decrease in academic track recommendations after the repeal. This can be explained by a decline in student achievement as binding track recommendations act as an performance incentive in primary school (Bach & Fischer, 2020).

The unchanged SES gap in academic track recommendations stands in contrast to changes in non-compliance behavior. Panel (b) shows that upward non-compliance increases substantially across quartiles. However, parents in high-SES counties are much more likely enroll their children in the academic track despite a recommendation for a lower track after the repeal than parents in low-SES counties, consistent with social differences in educational aspirations. Yet this does not raise the SES gap in academic enrollment due to a decline in downward non-compliance in the bottom quartile (Panel (c))—a larger share of students with a recommendation for the academic track in low-SES counties follows this recommendation relative to before the repeal instead of enrolling in a non-academic track.

Table 3 complements the graphical analyses by reporting estimates from the following dosage model using disaggregated data for all counties:

$$y_{c,t} = \alpha_t + \beta_c + \gamma \mathbb{1}(t \geq 2012) \times SES_c + \epsilon_{r_c} \quad (2)$$

where α_t are year dummies, β_c are county fixed effects, and SES is the share of the adult population with an academic degree in county c. The coefficient on the interaction term post-repeal times the share of the adult population with an academic track qualification ($\mathbb{1}(t \geq 2012) \times SES_c$) is the coefficient of interest. The dosage model regressions are weighted by the yearly number of transitions per county. To account for the different pre-repeal time trends across counties documented above in Fig. 3, I follow the two-step strategy in Goodman-Bacon (2021) and estimate model (2) using data that are corrected for linear trends estimated over the pre-repeal period.[17]

[17] I estimate linear trends in outcomes separately for each county using only the pre-treatment years and then subtract these time trend terms from the full panel. Including county-specific linear trends yields virtually identical results (Table A.7, Panel (d)).

Table 3
Free track choice effects on SES gaps in track decisions: Dosage analysis.
Source: Own calculations based on data from the Statistical Office of Baden-Württemberg.

			Non-compliance likelihood		Non-compliance enrollment	
	Academic track enrollment	Academic track rec.	upward	downward	academic	non-academic
	(1)	(2)	(3)	(4)	(5)	(6)
Post-repeal × SES	−2.15	3.84	40.17***	22.78***	8.88**	14.87***
	(3.60)	(2.88)	(12.68)	(3.73)	(3.73)	(2.06)
	[0.54]	[0.20]	[0.00]	[0.00]	[0.04]	[0.00]
County FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	528	528	528	528	528	528
Mean of dep. var. in 2011	41.41	50.73	1.34	18.98	0.33	9.65
4.-1. SES quartile gap of dep. var. in 2011	15.88	9.68	0.97	−16.35	0.21	−5.99

Notes: The table presents the effects of the repeal of binding track recommendations on SES gaps in track decisions and academic track recommendations based on the time series data by counties and years. Each column within a panel reports estimates from a different regression where the outcome variable is regressed on year dummies, county fixed effects, and an interaction of a post-reform dummy (2012+) and the share of the adult population with an academic track qualification. The coefficient on the interaction is reported. All regressions are weighted by the county-year specific number of transitions. All outcomes are measured in percentage points and have been corrected for linear trends estimated over the 2005–2011 period. Outcome variables are given in the column headers. Upward non-compliance likelihood (column 3) refers to the probability to enroll in the academic track conditional on not having an academic track recommendation. Downward non-compliance likelihood (column 4) refers to the probability to enroll in a non-academic track conditional on having an academic track recommendation. Non-compliance enrollment academic (column 5) refers to enrollment in the academic track for students without academic track recommendations. Non-compliance enrollment non-academic (column 6) refers to enrollment in non-academic tracks for students with academic track recommendations. Standard errors clustered at the county level are reported in parentheses. Two-sided *p*-values estimated using the wild bootstrap procedure with clustering at the county level are reported in brackets.

The main identifying assumption of this approach is that, absent the repeal, track decisions within a county would have continued to evolve according their linear pre-repeal trends. Consistent with this assumption, transition rates (unconditional and conditional on track recommendations) for the different quartiles follow smooth and clearly linear trends over the pre-repeal period (see Figs. 3, 4, and A.1). To further check the validity of this approach, Appendix A reports placebo estimates obtained by backdating the repeal year.

To account for the fact that cluster-robust standard errors for the dosage model with 44 clusters might be biased downward, I also report *p*-values based on the wild cluster bootstrap method as suggested by Cameron et al. (2008).[18]

The dosage estimate in Table 3, column 1, confirms the finding of no increase in the top-bottom quartile academic enrollment gap using variation across all counties. If anything, the academic track enrollment gap is estimated to (not statistically significantly) decrease by 2.15 p.p. after the repeal between counties which differ by 10 p.p. in the share of the adult population with an academic track qualification. The gap in the share of academic track recommendation also does not change statistically significantly after the repeal (column 2). In contrast, non-compliance changes substantially after the repeal between lower and higher SES counties (columns 3–4). These estimates are much larger in magnitude, statistically significant, and consistent with the heterogeneous responses by SES and track recommendation documented above.[19] Appendix Figure A.2 further reports binscatter plots for the dosage model. These show that the estimated upward and downward non-compliance effects are linear in the SES share and not driven by individual counties.

Appendix Figure A.3 also shows that the SES gap does not increase at the basic versus non-basic track margin.[20] Panel (a) shows unconditional transitions into the non-basic tracks (intermediate and academic) by quartile. If anything, transitions into a track higher than the basic track increase more in lower- compared to higher-SES counties. Panel (c) further shows a sharp and substantial increase in upward non-compliance of about 30%–40% at the basic track margin (i.e. students with a basic track recommendation enrolling in a higher track) after the repeal. In contrast to the academic track margin in Fig. 4, the increase in upward non-compliance at the basic track margin is relatively similar in higher- and lower-SES counties. A likely explanation is that preferences against the basic track are similarly prevalent across SES. This explanation is consistent with the small share of less than 2% of students enrolling in the basic track among those with recommendations for a higher track even in the bottom quartile (Figure A.4, Panel (d)).

4.2. Student-level results

I next turn to a student-level analysis using the NAS data. These data have several advantages over the county-level school records. First, students can be grouped by family background at the individual level, which allows for a more granular analysis. Second, effects can be traced out along the achievement distribution using the standardized test score data, a more objective measure of student achievement compared to teacher-assigned track recommendations. Third, the analysis can be expanded to include the repeal state Saxony-Anhalt, and draw on other states, which did not change their track recommendation system, as a control group. This allows to account for any secular changes in school track decisions over time that differ by parental background. The inclusion of several states in the analysis, however, restricts the analysis to the academic track margin as most states do not have separate basic and intermediate tracks. Another drawback of the NAS data is that only one pre- and post-repeal wave are available.[21]

I first use the NAS data to replicate the unconditional effect of the repeal on academic track transitions by SES at the individual-student level. The effect of the repeal is identified from a change

[18] This is done by using the STATA program *boottest* (Roodman et al., 2018) using the default option, i.e. the restricted wild cluster bootstrap. Unrestricted wild cluster bootstrap *p*-values give almost identical results—a useful diagnostic check for their validity according to MacKinnon and Webb (2018).

[19] It is a priori unclear how changes in the SES gaps in non-compliance in columns 3–4 affect overall academic track enrollment of previously eligible and ineligible students differently by SES. The effect on total academic track enrollment also depends on the baseline SES gap in academic track recommendations, which was 9.7 p.p. in 2011. Despite this baseline gap, columns 5–6 show an increase and decline in the SES gap in upward and downward non-complier enrollment (expressed as a share of all transitions), respectively. These two effects cause the SES gap in academic track enrollment to not increase after the repeal.

[20] Figure A.3 shows detrended data for the top and bottom quartile while Figure A.4, shows raw means for all quartiles.

[21] PIRSL 2006 (Progress in International Reading Literacy Study), the predecessor to the NAS, does not contain information on students' track recommendation.

Table 4
Free track choice effects on academic track transitions (DID).
Source: Own calculations based on NAS waves 2011 and 2016.

	(1)	(2)	(3)
Free track choice	0.055**	0.053**	0.063***
	(0.022)	(0.023)	(0.015)
	[0.107]	[0.107]	[0.036]
Free track choice × high-SES	−0.015	−0.010	−0.016
	(0.017)	(0.017)	(0.018)
	[0.679]	[0.786]	[0.643]
State & year FE	✓	✓	✓
Student-level controls (excl. test scores)		✓	✓
Test score controls			✓
N	19,123	19,123	19,123
R^2	0.16	0.19	0.34

Notes: Each column of the table reports results from a separate regression where the outcome variable is academic track enrollment. Student-level controls include parents' highest years of education and ISEI, and dummies for migration background, German spoken at home, and gender. Standard errors in parentheses allow for clustering at the state level. One-side permutation-based *p*-values from repeatedly reassigning the repeal indicator to all possible permutations of two non-repeal states are reported in brackets. *p*-values for the interaction coefficient (Free track choice × high-SES) are based on two-sided tests.

in the academic track enrollment between the pre- and post-repeal cohort in the two repeal states Baden-Württemberg and Saxony-Anhalt relative to states which did not change their track recommendation system. Table 4 reports these results. All regressions are weighted by the student weights provided by the NAS and include state and year fixed effects, as well as indicators for free track choice (i.e. repeal of binding track recommendations), high-SES, and their interaction. The main identifying assumption is that academic track decisions would have evolved similarly in repeal and no-repeal states in the absence of the repeal.

Since track recommendation rules differ at the state level and the total number of states and those which repeal binding track recommendations is small (10 and 2, respectively), cluster-robust standard errors with clustering at the state level likely result in over-rejection (Cameron et al., 2008). For this reason, I always report permutation based *p*-values for the NAS results as well (MacKinnon & Webb, 2020).[22] Given the finding from the previous section that academic track enrollment increased for all groups after the repeal, I assume that the repeal has either positive or no effect on academic track enrollment and use one-sided permutation based *p*-values to test hypotheses with the NAS data.

In the baseline specification, free track choice is estimated to increase academic track enrollment for low-SES students by 5.5 p.p. (Table 4, column 1). The interaction coefficient suggests no change in the SES academic track enrollment gap. Column 2 shows that the inclusion of further student-level controls (migration background, German spoken at home, HISEI, highest years of parental education, and gender) yields virtually the same estimate, suggesting that changes in the composition of students between repeal and no-repeal states over time do not explain these effects. Column 3 shows that conditional on students' standardized test scores, free track choice increases academic track enrollment for low-SES students even more by 6.3 p.p. and that the SES gap is reduced by 1.6 p.p. (although not statistically significantly). Appendix D reports results for an alternative measure of the effect of free track choice on social inequality. I estimate the effect on inequality of opportunity by comparing changes in the variance of academic track enrollment explained by family background before and after the repeal. Consistent with the limited change in the SES gap documented in Table 4, the variance in academic track enrollment explained by family background changes little with the introduction of free track choice.

Table 5 reports the effect of free track choice on academic track enrollment estimated separately by track recommendation and parental background. The results of the baseline specification in column 1 confirm the previous county-level results for Baden-Württemberg: low-SES students with an academic track recommendation are 12.2 p.p. more likely to enroll in the academic track when recommendations are not binding (Panel (b)). There is no change in academic track enrollment for high-SES students with an academic track recommendation (Panel (a)). However, high-SES students without an academic track recommendation are 21.7 p.p. more likely to enter the academic track when track recommendations are not binding (Panel (c)) while low-SES students without academic track recommendations enroll only 8.2 p.p. more often (Panel (d)). The similarity in results across specifications with and without student demographic and test score controls suggests that changes in the composition of students do not explain these enrollment differences in response to free track choice.[23] Whether one bases inference on cluster-robust standard errors or randomization inference, leads to similar conclusions: effects in Panels (b)–(c) are significant at the 1% level according to cluster-robust standard errors and they are the largest effects across all possible permutations of the data.[24]

Fig. 5 shows how academic track enrollment changes across the achievement distribution and by parental background in repeal states. Panels (a) and (b) show enrollment shares for the full AI distribution smoothed across percentiles for the pre- and post-repeal cohorts for high- and low-SES students, respectively. A comparison of panels (a) and (b) reveals substantial SES gaps in academic track enrollment before the repeal. At the median of the achievement distribution, low-SES students were less than half as likely to enroll in the academic track (30%) than high-SES students (70%). When track recommendations become nonbinding, changes in the likelihood to enroll in the academic track across the achievement distribution clearly differ by parental background. Panel (c) plots the change in the academic track enrollment gap between high- and low-SES students by AI percentile over time. While the SES gap in academic track enrollment decreases in the middle of the distribution (between the 30th and 90 percentile), the reverse is true for the bottom quartile of the achievement distribution. The dashed line shows that a similar pattern emerges when comparing the changes in the SES gap in repeal states to those in no-repeal states. These results confirm the asymmetric responses documented in Fig. 4, Table 3, and Table 5 without conditioning on students' track recommendation. This alleviates concerns that the heterogeneity in responses is driven by changes in the composition of students receiving an academic track recommendation after the repeal.

[22] These are obtained by reassigning repeal status for the post-repeal cohort to all possible permutations of pairs of no-repeal states. Since there are 28 possible permutations ($\frac{8!}{(8!-2!)2!}$), *p*-values are only set-identified. In case an estimate's *p*-value falls into the lowest set, I always report a set's upper limit, which is 0.036 (= $\frac{1}{28}$). I also report wild cluster bootstrap *p*-values for the NAS results in Tables A.4 and A.5. However, MacKinnon and Webb (2018) show that this procedure can fail dramatically when there are only few treated clusters in DiD settings. Tests based on the restricted wild cluster bootstrap can under-reject severely, and tests based on the unrestricted version can over-reject severely. When both procedures lead to very different *p*-values neither can be trusted. Appendix Tables A.4 and A.5. show this to be the case in my setting.

[23] Appendix Table A.6 provides an additional test for compositional differences as a potential explanation for the changes in academic track enrollment by testing whether track recommendations changed differently between repeal and no-repeal states. There is no evidence that the share of academic track recommendations for low- and high-SES students changed differentially between repeal- and no-repeal states after the repeal.

[24] Hence the *p*-value of 0.036 (= $\frac{1}{28}$).

Table 5
Free track choice effects on academic track transitions by recommendation and SES (DID).
Source: Own calculations based on NAS waves 2011 and 2016.

	(1)	(2)	(3)
Panel (a): Academic track rec. & high-SES sample			
Free track choice	0.025	0.025	0.024
	(0.018)	(0.018)	(0.017)
	[0.286]	[0.286]	[0.286]
N	6,131	6,131	6,131
R^2	0.011	0.020	0.035
Panel (b): Academic track rec. & low-SES sample			
Free track choice	0.122***	0.116***	0.123***
	(0.045)	(0.043)	(0.038)
	[0.036]	[0.036]	[0.036]
N	3,823	3,823	3,823
R^2	0.034	0.046	0.083
Panel (c): Non-academic track rec. & high-SES sample			
Free track choice	0.217***	0.205***	0.194***
	(0.033)	(0.034)	(0.031)
	[0.036]	[0.036]	[0.036]
N	2,500	2,500	2,500
R^2	0.034	0.046	0.083
Panel (d): Non-academic track rec. & low-SES sample			
Free track choice	0.082***	0.080***	0.078***
	(0.014)	(0.015)	(0.014)
	[0.036]	[0.036]	[0.036]
N	6,669	6,669	6,669
R^2	0.019	0.031	0.052
State & year FE	✓	✓	✓
Student-level controls (excl. test scores)		✓	✓
Test score controls			✓

Notes: Each cell reports results from a separate regression where the outcome variable is academic track enrollment. Student-level controls include parents' highest years of education and ISEI, and dummies for migration background, German spoken at home, and gender. Standard errors in parentheses allow for clustering at the state level. One-sided permutation-based *p*-values from repeatedly reassigning the repeal indicator to all possible permutations of two non-repeal states are reported in brackets.

5. Mechanisms

The positive effect of free track choice on low-SES students' decision to comply with a recommendation for the academic track is surprising since their choice set did not expand after the repeal. Appendix C presents several pieces of evidence against mechanical explanations for this finding such as (i) changes in the composition of students who receive an academic track recommendation; (ii) intermediate track school closures; (iii) binding capacity constraints in intermediate track schools; and (iv) the gradual transformation of basic track schools into comprehensive schools in Baden-Württemberg.

Instead, I next assess in more detail a potential behavioral explanation for the decrease in downward non-compliance for low-SES students in response to free track choice: changes in the perceived value of the alternative to the academic track due to the repeal of binding recommendations. Note that low-SES students often attend a lower track than recommended compared to high-SES students. For example, before the repeal 23.5% of students with a recommendation for the academic track enrolled in the intermediate track in the bottom SES quartile of Baden-Württemberg (Table A.1). This indicates that disadvantaged households trade off the perceived benefits of the academic track against other considerations (e.g., the fear of failure in the higher track). For high-SES households, in contrast, this trade off seems less relevant, as indicated by a low downward non-compliance of less than 8% in the top quartile in Baden-Württemberg (Table A.1). This heterogeneity in track preferences renders low-SES households' track decisions potentially more malleable to slight changes in the different tracks.

A major change as a result of the repeal was a shift of students from the basic to the intermediate track in Baden-Württemberg. Appendix Figure A.4 documents a dramatic increase in intermediate track enrollment of students with only a basic track recommendation after the repeal. This can make the intermediate track less attractive for two reasons: (i) peer preferences and (ii) changes in the expected value of an intermediate qualification. First, the inflow of students recommended for the basic track lowers average achievement and average SES in the intermediate track. Preferences for good peer groups (in terms of achievement or socio-economic background) therefore reduce the perceived quality of the intermediate track after the repeal. Second, the upward cascade of students from lower into higher tracks (both into the intermediate and the academic track) could raise fears of qualification inflation due to an increase in graduates with more than a basic track qualification, and hence stronger competition for jobs requiring at least an intermediate qualification. This could decrease the expected value of an intermediate relative to an academic track qualification.

5.1. Between-state differences in tracking systems

To investigate whether the inflow of basic track students into the intermediate track after the repeal can explain the increase in academic transitions for low-SES students with an academic track recommendation, I first exploit differences in the institutional setup of the tracking systems across states. While some states have 3-tiered tracking systems (with separate schools for the basic, intermediate, and academic track), others have a 2-tiered systems, where the basic and intermediate track are combined within one comprehensive school. Since comprehensive schools accept all students regardless of their recommendation, concerns about the inflow of low achieving students with a basic track recommendation when track recommendations are not binding should not matter in a 2-tiered system.

A test for whether concerns about the inflow of low-achieving students can explain low-SES students' behavior thus amounts to a comparison of the effect of repealing binding track recommendations in states with 2-tiered systems (Saxony-Anhalt) and 3-tiered systems (Baden-Württemberg). Unfortunately, I cannot perform such a test in a difference-in-differences design with a pre- and post-repeal comparison. This is because there are only two repeal states in the NAS data and it is prohibited to report results which allow the identification of results

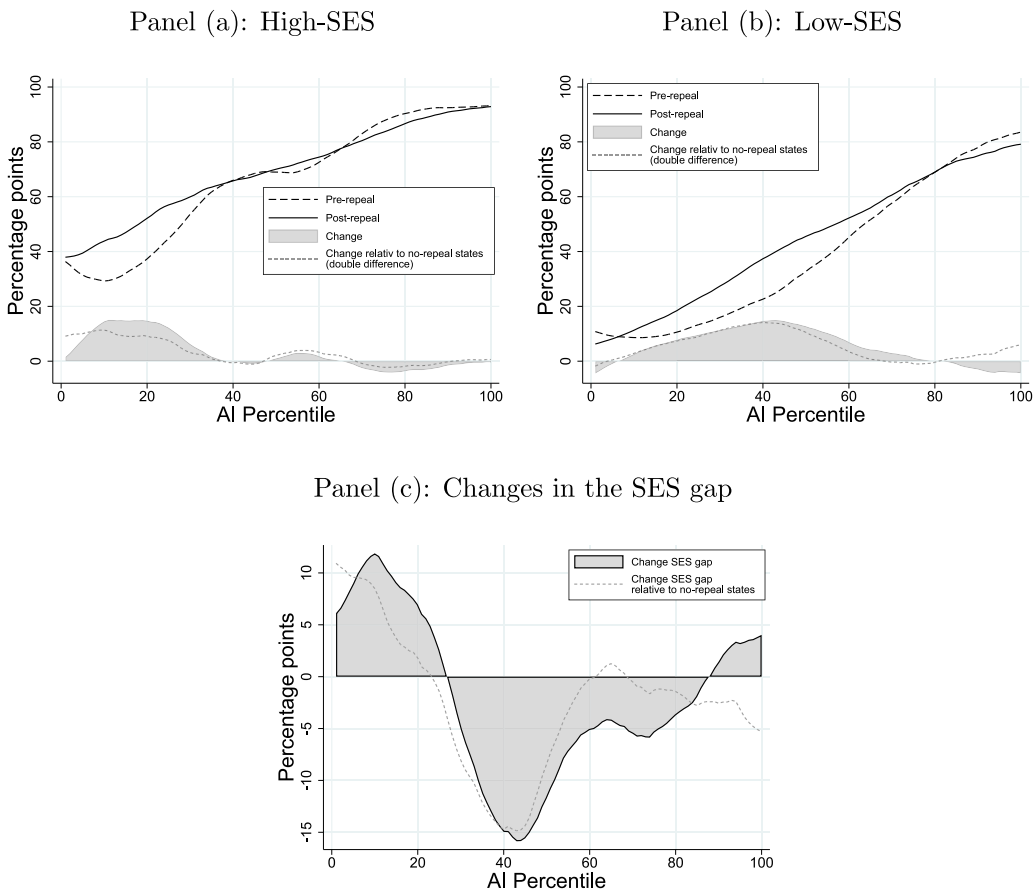

Fig. 5. Academic track transitions before and after the repeal by academic achievement.
Notes: Panels (a) and (b) plot the likelihood to enroll in the academic track in repeal states before (2011) and after (2016) the repeal of binding track recommendations by percentile of achievement index (AI) for high- and low-SES students, respectively. These statistics are smoothed with a triangular kernel with bandwidth 20. The gray shaded areas give the change over time in these statistics. The dashed gray lines gives the change relative to the respective change in no-repeal states. Panel (c) uses the statistics from Panels (a) and (b) and plots the change in the SES academic track enrollment gap over time by AI. The gray shaded area is the change in the SES gap in repeal states. The dashed gray line is the change in the SES gap in repeal states relative to the respective change in no-repal states.
Source: Own calculations based on NAS waves 2011 and 2016.

for a single state (i.e. the NAS only allows to report results for groups of at least two states).[25]

Instead, I draw on the pre-repeal NAS cohort and leverage between-state variation. For the pre-repeal cohort, all states can be classified into 2-tiered and 3-tiered systems with binding or nonbinding track recommendations. The four resulting groups all contain at least two states.[26] Across these four group of states I test for differences in compliance with academic track recommendations, with the caveat that this is a purely cross-sectional analysis that is potentially subject to bias from unobserved between-state differences.

Fig. 6 provides a visual illustration for the mediating role of the tracking system for the relationship between binding track recommendations and compliance with academic track recommendations. The figure shows the likelihood to enroll in the academic track conditional on an academic track recommendation by whether or not track recommendations are binding, 2-tiered and 3-tiered tracking systems, and parental background. Low-SES students (dark bars) clearly exhibit different compliance with an academic track recommendation depending on the school system. Within 3-tiered systems, compliance is much higher when track recommendations are binding (85%) than when they are not (68%), while in 2-tiered systems, compliance rates for low-SES background students do not differ much between binding and nonbinding systems (78% versus 81%). In contrast, high-SES students' compliance (gray bars) is similarly high across all four systems (above 89%). If at all, the pattern for high-SES students in 3-tiered systems is the reverse of that for the low-SES group with higher compliance when track recommendation are binding. Table A.10 shows that these differences are statistically significant and persist when controlling for student characteristics.[27] These results support the idea that the potential inflow of low-achieving students into the intermediate track in 3-tiered systems explain low-SES students' increased academic track enrollment when track recommendation become nonbinding.

[25] The fact that Baden-Württemberg, which initially had a 3-tiered system when the pre-repeal cohort transitioned to secondary school, moved to a hybrid system (i.e. there was an expansion of comprehensive track schools starting in 2012) further limits the possibility to perform such a test with the NAS data. The other repeal state, Saxony-Anhalt, does not collect data on track decisions by track recommendations, ruling out analyses of track decision of students conditional on academic track recommendations.

[26] By the time the post-repeal cohort transitioned to secondary school, almost all states had adopted a 2-tiered systems or hybrid version (with basic, intermediate, comprehensive and academic tracks), which does not allow for a clear classification into 2-tiered and 3-tiered systems for this cohort. In contrast to the sample above (Tables 4 and 5), however, I include the states Schleswig-Holstein, Lower-Saxony, and Bremen in this analysis. These states had to be dropped for the DiD analyses above because the track recommendation information is missing for the majority of students for the post-repeal cohort (but not the pre-repeal cohort).

[27] See Appendix for a detailed discussion of Table A.10.

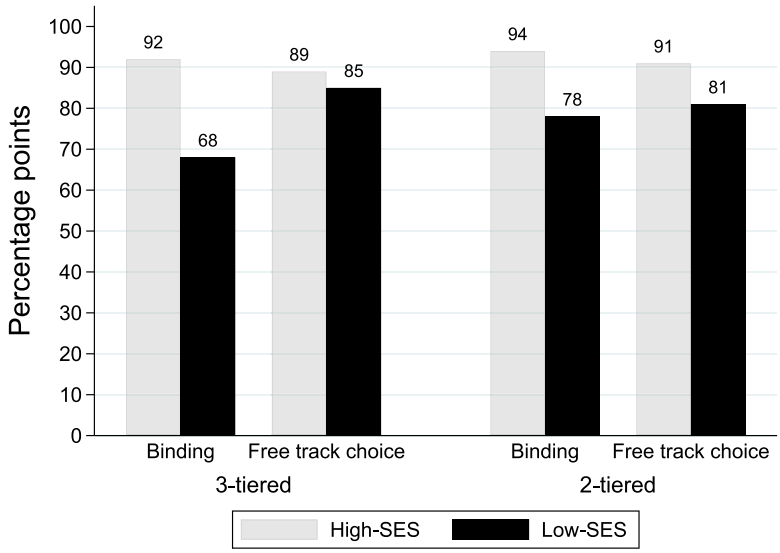

Fig. 6. Academic track transitions conditional on academic track recommendation by SES, binding recommendations, and tracking system.
Notes: The figures plots the probability to enroll in the academic track for students with an academic track recommendation by SES, binding versus nonbinding track recommendation, and 3-tiered versus 2-tiered tracking systems. States are classified in the following way: binding and 3-tiered system: Baden-Württemberg and Bavaria; nonbinding and 3-tiered system: Lower-Saxony, North Rhine-Westphalia, and Hesse. Binding and 2-tiered system: Saxony, Saxony-Anhalt, and Thuringia; nonbinding and 2-tiered system: Schlesweig-Holstein, Hamburg, Bremen, Rhineland-Palatinate, and Saarland.
Source: Own calculations based on NAS 2011 wave.

5.2. Comprehensive schools in Baden-Württemberg

The context in Baden-Württemberg facilitates another test for the hypothesis that concerns about the inflow of basic track students can explain low-SES students' response to free track choice. Prior to the repeal, Baden-Württemberg had a traditional 3-tiered tracking system. However, across the entire state there are counties, which had, in addition to the traditional three tracks, comprehensive schools (*Schulen besonderer Art*), where students are taught jointly and can attain all three track-specific qualifications. These are Freiburg, Heidelberg, and Mannheim. Students with a basic track recommendation in these cities could already avoid the lowest track by attending a comprehensive school before the repeal. Furthermore, these comprehensive schools are located in more disadvantaged neighborhoods but have mixed student compositions in terms of track recommendations (with a considerable share of students with basic and academic track recommendations).[28] The relatively high share of students with an academic track recommendation likely results from the fact that these schools offer a direct path an academic track qualification with lower risk and cost of failure relative to an academic track school. This is because streaming of students into different tracks is delayed to grade 7 in comprehensive schools and students who cannot keep up with the academic track curriculum after grade 7 can change tracks within the same school instead of having to switch to an intermediate track school. Hence, these schools likely cater to those high-achieving, low-SES students for whom the trade off between the intermediate and academic track is relevant and who would have opted for the intermediate track absent comprehensive schools and nonbinding track recommendations. As these downward non-compliers in comprehensive schools already attended schools with a large share of students with a basic track recommendation before the repeal, their track decisions should be less sensitive to potential concerns about the inflow of low-achieving students after the repeal.

Fig. 7 tests whether downward non-compliance responses to free track choice differ across counties with and without comprehensive schools within Baden-Württemberg. The three counties with comprehensive schools are large urban districts with county rights (*Stadtkreise*) and have, on average, a more educated populations. Thus, I restrict the comparison group to urban cities with counties rights from the top SES quartile in Baden-Württemberg.[29] The figure shows the evolution of the probability to attend the intermediate track conditional on receiving an academic track recommendation for the two group of counties.[30] Relative to counties with comprehensive schools, students in counties with stricter tracking systems are clearly less likely to enroll in the intermediate track after the repeal conditional on having an academic track recommendation. At the same time, Appendix Figure A.7 shows a substantial increase in academic track transitions by students without an academic track recommendations in counties with comprehensive schools. These two patterns are consistent with a "push" explanation for low-SES students' behavior: low-SES students, who were already eligible for the academic track before the repeal, become more likely to enroll in the academic track to avoid the potential inflow of low-achieving students into the intermediate track. They do not seem to be drawn into the academic track by the increased number of previously ineligible students in the academic track. Collectively, the evidence based on these two approaches provides consistent evidence for the role of concerns about the inflow of students with basic track recommendations into the intermediate track for low-SES students' increased academic track enrollment after the repeal

[28] For instance, the share of students in comprehensive schools with a recommendation for the basic, intermediate, and academic track in Mannheim is 42%, 32,9%, and 24,8%, respectively (Mannheim, 2018, Table D12web). In Heidelberg, more than 30% of the students in comprehensive schools have an academic track recommendation (Heidelberg, 2017, Figure 71).

[29] Since the three counties with comprehensive schools are in the top-SES quartile, this could potentially explain why downward non-compliance for the top quartile changed differently after the repeal compared to the lower three quartiles, independent of SES. To test this, Panel (e) in Table A.7 reports corresponding estimates for the main results in Table 3 excluding these three counties. The results are very similar to my baseline estimates. Furthermore, binscatter plots for the dosage model (A.2) show that results are linear in the SES measure and not driven by individual counties. Together, this suggests that the presence of comprehensive schools in three counties in the top-SES quartile do not confound my estimates.

[30] For brevity, I only report times series normalized to 2011 values and corrected for linear trends, estimated over the pre-repeal period. Appendix Figure A.6 reports raw means.

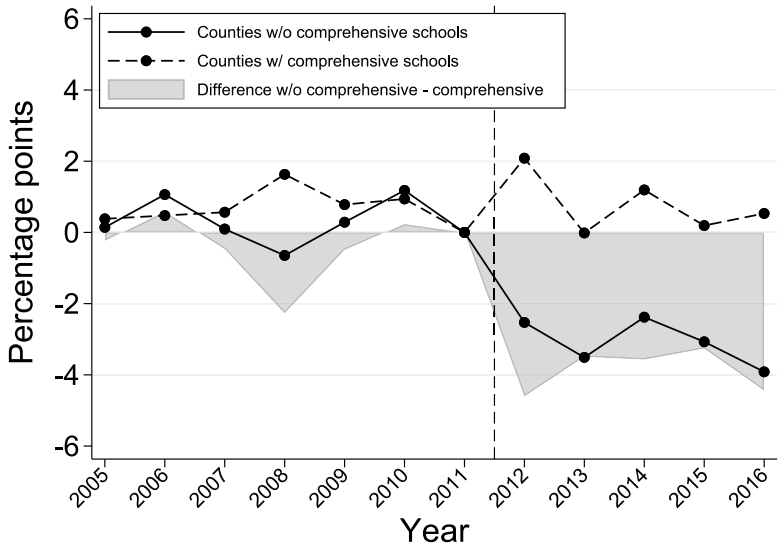

Fig. 7. Transitions into the intermediate track conditional on academic track recommendation by presence of comprehensive schools.
Notes: The figures plots the probability to enroll in the intermediate track conditional on receiving an academic track recommendation. The probabilities are normalized to 2011 levels and corrected for linear trends estimated over the 2005–2011 period. Counties with comprehensive schools prior to 2012 are Heidelberg, Freiburg, and Mannheim. The group of counties without comprehensive schools are restricted to cities with county rights (Baden-Baden, Karlsruhe, Konstanz, Stuttgart, Tübingen, and Ulm). The gray shaded area gives the difference between the group of counties with and without comprehensive schools.
Source: Own calculations based on data from the Statistical Office of Baden-Württemberg.

6. Conclusion

This paper documents responses in school track decisions to the repeal of binding track recommendations by family background. The context is Germany's early between-school tracking system, where students are sorted into hierarchically ordered school tracks at the end of primary school. Across two data sets, exploiting the repeal of binding track recommendation in two federal states, I find that free track choice does not increase the SES gap in academic track enrollment (the highest track). However, this null effect masks different responses by parental background at two margins: for students without an academic track recommendation – who were previously ineligible for the academic track – the SES gap in academic track enrollment increases by more than 10 p.p. after the repeal. This is due to high defiance of non-academic track recommendations by high-SES students of around 19.4 p.p. This effect, however, is offset by low-SES students with an academic track recommendation—who were already eligible for the academic track prior to the repeal. These students are 12.3 p.p. more likely to comply with an academic track recommendation after the repeal. No similar effect was found for previously eligible high-SES students, for whom compliance was already high before the repeal.

The increase in academic track enrollment of previously ineligible students under free track choice is not surprising and the larger effect for high-SES students confirms previous survey evidence for social differences in educational aspirations. However, the effect for previously eligible low-SES students presents a puzzle. Evidence from two different approaches suggests that the effect can be partly explained by concerns about the inflow of low-achieving students from the lowest (basic) into the intermediate track under free track choice.

The latter finding implies that track decisions of low-SES households are sensitive to contextual factors and hence potentially malleable to policy interventions. This also helps to explain why social programs, such as mentoring (Carlana et al., 2022; Falk et al., 2020), can have large positive effects on disadvantaged students' schooling decisions net of their potential achievement effects.

The main goal for the repeal of binding track recommendations was to allow students to attend a higher track than recommended. Given the strong response to increased choice for previously eligible students also highlights that large-scale reforms may have substantial *indirect* effects that work in offsetting or reinforcing ways.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The county-level data can be made available on request. The IQB student-level data are available from the IQB to researchers signing the relevant data use agreements.

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Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.econedurev.2023.102412.

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