Peer Effects on College Choice: Evidence from Affirmative Action in China*

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Preliminary Version

Abstract

Affirmative action, implemented in higher education across many countries, aims to promote equal opportunity and improve the representation of underrepresented groups. This paper investigates causal evidence on the influence of peers on student participation in an affirmative action program - the Ethnic Minority Preparatory Classes (EMPC) for college - specifically targets ethnic minority students in China. Utilizing China's unique centralized admissions system and student-level administrative data from one of the poorest provinces, we employ a difference-in-differences framework to estimate the impact of peer success on college admissions. We define peers as ethnic minority students from the same school and registered residence who graduated in the previous year. Our findings show that successful college admissions of peers through affirmative action programs lead to a 2.49% increase in admissions for potential ethnic minority applicants. Additionally, male students and those in a non-STEM track benefit more, with admissions to the program increasing by 3.1% for both groups. Potential applicants whose national college entrance exam scores meet the tier 1 college application threshold experience an even greater influence from peers. These results highlight the substantial impact of peer networks in shaping higher education outcomes for disadvantaged groups and provide insights for enhancing the engagement of underrepresented communities in public programs.

Keywords: Affirmative Action, Peer Effects, College Choice, Ethnicity
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1 Introduction

While global inequality has decreased over the past decade due to globalization and increased shared prosperity, 20% of the world's population still resides in high-inequality economies (Gini coefficient above 40), and only 7% lives in economies with low inequality (Gini below 30) (World Bank, 2024). Education plays an important role in reducing poverty and promoting equality by accumulating human capital and fostering skills acquisition, which improve individuals' prospects in the labor market and contribute to lifelong well-being. However, educational inequities persist both across and within countries, particularly in developing regions.[1] These inequities often intersect with socioeconomic status, gender, race and ethnicity, and location (Blanden et al., 2023). Addressing these disparities requires targeted public policy interventions to promote equitable access to education and mitigate outcome gaps.

In higher education, affirmative action policies are designed to increase the representation of disadvantaged students. However, these efforts are often undermined by information asymmetry, which disproportionately affects underprivileged students. Limited access to accurate and relevant information about such policies often prevents these students from making informed decisions and fully benefiting from government programs designed to support them.

College attendance is an essential determinant in shaping individuals' higher education outcomes, academic trajectories, and career development. However, key challenges persist: Which college is most suitable, and how can the costs associated with higher education be effectively managed? For disadvantaged students, particularly those from low-income or rural backgrounds and minority groups, these concerns are compounded by limited access to pertinent information about colleges and admission policies (Hoxby and Avery, 2013). This resource deficit restricts their ability to make informed choices, ultimately influencing their

[1] According to UNESCO's estimation, 258 million children, adolescents, and youth worldwide are out of school, with a larger share from developing countries. Specifically, the out-of-school rate is 31% in sub-Saharan Africa and 21% in Central Asia, significantly higher than the global average of 17%, compared to just 3% in Europe and North America. More details can be found in *Global Education Monitoring Report 2020: Inclusion and Education: All Means All (UNESCO, 2020)*.

educational pathways.

As disadvantaged students often lack formal channels of support, informal networks become important in bridging these gaps. Peers within school and community networks can play a pivotal role in addressing these disparities by acting as channels for information dissemination. By alleviating information asymmetries, these networks assist disadvantaged students in accessing relevant resources and making more informed and strategic educational decisions. This paper examines the influence of peer effects on the participation of ethnic minority students in affirmative action programs in China, shedding light on the potential of peer networks to reduce inequities and enhance access to higher education.

Many studies have shown the gap in education, income, and occupational attainment between the ethnic minorities and the Han majority (Hannum and Xie, 1998; Gustafsson and Shi, 2003; Campos et al., 2016). Pan and Liu (2021) indicate that one of the main reasons for the rising educational gap between the Han majority and ethnic minorities in China could be the enforcement of birth control policies for the Han majority. This may lead to the reallocation of resources in families which makes parents invest more in Han children. Furthermore, the educational gap may also result in income inequality between ethnic minorities and Han in China. Therefore, it is important to gain a comprehensive understanding of how public policies function and the specific avenues through which these policies work to improve ethnic minorities' access to and achievement in higher education, especially for ethnic minority students who are disadvantaged status.

This study is the first to examine how peer effects can be leveraged to enhance the participation of ethnic minority students in affirmative action programs in China. In the context of China's centralized college admissions system, where applications and admissions are contingent on students' performance in the annual national exam, students are admitted based on a specific combination of one college and one major. Given the historical educational gap between the Han majority and the fifty-five ethnic minority groups, the Chinese government has implemented a series of preferential policies (a form of affirmative action) to support

ethnic minorities in higher education. These policies include bonus points and university preparatory classes specifically designed for ethnic minority students. However, there is limited evidence on how the EMPC program benefits ethnic minority students in higher education, particularly those from low-income or rural areas, the channels through which it influences higher education choices and admissions outcomes, how to improve the policy's efficiency to benefit a broader range of students, and how it helps to mitigate educational inequality.

In this paper, we explore how peers within students' social networks serve as a critical channel for conveying information. The dissemination of information about the EMPC program through these networks may significantly influence college application decisions and, consequently, the higher education admission outcomes of ethnic minority students. In our research, we define peers in five distinct ways: 1) students who graduated in the previous year but reside in the same county as the current year's students; 2) previous students who reside in the same county and attended the same school; 3) previous students who attended the same school; 4) previous students who attended the same school and had the same teacher; and 5) previous students who were from the same county and shared the same teacher. The "peer effect" is defined as the proportion of students who graduated in the previous year within each peer group and were admitted to the Ethnic Minority Preparatory Classes (EMPC) program in colleges.

Using administrative data on students' college applications and admissions from 2014 to 2018 in Ningxia, one of the poorest provinces in China, this study employs a difference-in-differences (DID) framework to estimate the impact of peer success on college admissions. The results show that peers' admission to colleges through the EMPC significantly increases students' own likelihood of admission to the program by 1.41%. The effect is particularly significant for male students and those in non-STEM tracks, with their admissions to the program increasing by 1.69% and 1.75%, respectively. These findings highlight the critical role of peer networks in amplifying the effectiveness of affirmative action programs.

This paper contributes to two main strands of literature. Firstly, many studies have shown that one's place of residence affects individual behavior and outcomes (Chyn and Katz, 2021; Barrios-Fernández, 2022) and social network plays an important role in decision-making (Altmejd et al., 2021). We investigate the combined influences of peer interactions across the county, school, and teacher levels, assessing their impact on students' educational decisions. The findings show that the proximity of peers within the different peer groups significantly impacts potential applicants' choices to pursue higher education.

Secondly, as demonstrated by research (Bobonis and Finan, 2009), peers exert substantial influence on the enrollment decisions of program-ineligible children, particularly those from economically disadvantaged backgrounds. For ethnic minority students originating from rural areas with lower socioeconomic status, this study offers insights into enhancing program participation among underprivileged students. Notably, our research sheds light on the preparatory classes program, which has received limited attention in existing discussions.

The rest of the paper is organized as follows. Section 2 introduces the context of affirmative action policies and the higher education system in India. Section 3 describes the data and Section 4 develops the empirical strategy. Section 5 shows various robustness checks. Section 6 presents conclusions.

2 Background

2.1 Centralized College Admissions in China

China operates a centralized college admissions system, where students must take the National College Entrance Examination (NCEE) before applying to college. The NCEE is organized and coordinated by the Ministry of Education and is held at a fixed time each year, typically

from June 7th to 10th, though in most provinces, it lasts only from June 7th to 8th.[2]

In late June, students receive their NCEE scores and begin making their college choices, submitting applications to the provincial (state) Department of Education. In China, the college application and admission process is conducted at the provincial level. Students select their STEM or non-STEM track in high school and compete for college-major spots only with peer applicants within the same province and track. Depending on the province, students typically apply to 4-10 colleges within each institutional tier and may select up to six majors for each college. However, final admissions are determined by a combination of one college and one major. Special admissions, which include ethnicity- and income-based affirmative action programs, allow students to apply simultaneously. Only students who meet specific score thresholds are eligible to apply to the corresponding colleges. Higher education institutions are generally divided into four tiers: the nation's elite colleges (Tier 1), public non-elite colleges (Tier 2), private four-year colleges (Tier 3), and other vocational or for-profit institutions (Tier 4). College admissions are based on students' application preferences but are ultimately determined by NCEE scores and the ranking of their applications for each enrollment position. Although the expansion of higher education has increased opportunities for students, the growing number of NCEE takers has kept competition for higher education, particularly at selective universities, extremely high. Tier 1 and Tier 2 colleges admit only the top 30-40% of applicants.

2.2 Affirmative Action for Ethnic Minorities

As one of the world's most populous countries, China began classifying fifty-five ethnic minorities and designating autonomous areas in 1949. According to data from China's Seventh National Census in 2020, the country has a population of 1.411 billion, with ethnic minorities comprising 8.89% of the total. Compared to 2010, the ethnic minority population

[2]On the morning of June 7th, from 9:00 to 11:30, the Chinese exam takes place. In the afternoon, from 3:00 to 5:00, the Mathematics exam is held. On the morning of June 8th, from 9:00 to 11:30, students take either the Humanities Comprehensive or Science Comprehensive exam. In the afternoon, from 3:00 to 5:00, the foreign language exam is conducted.

grew by 10.26%, and their proportion of the total population increased by 0.40%. Data from the China Family Panel Studies (CFPS) dataset in 2018 reveals that only 2.5% of ethnic minorities hold a 4-year college degree or higher, compared to 4.2% among the Han majority. Additionally, the average years of education for the Han majority is 6.8, while it is 5.0 for ethnic minorities. Overall, the educational attainment of ethnic minorities has lagged behind that of the Han majority, with this educational gap being a significant factor contributing to the underrepresentation of ethnic minorities in areas such as health, income, and poverty.

To empower ethnic minorities in higher education, China has implemented a series of affirmative action (AA) policies since the mid-1980s. These policies are generally divided into two categories: bonus points policy and university preparatory classes specifically designed for ethnic minority students. Under the bonus points policy, ethnic minority students receive additional points on their national college entrance examinations, enabling them to gain admission to universities with relatively lower scores compared to Han majority students, thereby facilitating access to higher education for minority groups (Yang and Wu, 2009). After receiving bonus points, ethnic minority students can also opt to attend university preparatory classes, which typically last one or two years before entering university. While these preparatory classes are intended to help minority students adequately prepare for university, some critics argue that they may disadvantage Han majority students and that families with better socioeconomic conditions within ethnic minority communities may benefit more than those from disadvantaged backgrounds (Liu, 2023; Teng and Ma, 2005; Zheng, 2011). Overall, ethnic minority students are able to gain admission to educational institutions through these preferential policies, often with significantly lower admission standards compared to Han majority candidates.

2.3 EMPC Program

The Ethnic Minority Preparatory Classes (EMPC) Program is a special policy established by the Chinese government to support the advancement of ethnic minority students in higher

education. The EMPC offers preparatory education for ethnic minority students who have participated in the current year's NCEE, allowing them to apply to regular higher education institutions with relatively lower score requirements. However, this opportunity is contingent upon completing one or two additional years of study in the program. The EMPC program is implemented at both the undergraduate and associate (higher vocational) levels in higher education institutions. As students in the EMPC program study high school-level cultural subjects and prepare for college education, the program serves as a bridge between high school and higher education. Participation in the EMPC program effectively extends the duration of higher education to one or two years of preparatory study plus 4 years of regular undergraduate education.

Eligible students for the EMPC program are those from ethnic minority backgrounds who have participated in the current year's NCEE and gained admission based on their NCEE scores and rankings, following the same procedure as regular undergraduate or vocational admissions.[3] Ethnic minority students applying for undergraduate preparatory classes can be admitted with scores up to 80 points below the respective undergraduate admission threshold for the corresponding college tier of chosen university, while those applying for vocational preparatory classes can be admitted with scores up to 60 points below the vocational admission threshold. Additionally, there are two types of preparatory education under the EMPC program. The first involves higher education institutions conducting the preparatory classes themselves, where students complete both the EMPC and their undergraduate studies at the same institution. The second type involves a specialized institution offering preparatory education for multiple colleges. In this case, students spend one or two years in the preparatory stage at this institution and, upon passing the final examination, transfer to their admitted institution for the four-year undergraduate program. Upon successful completion of the

[3]There are two types of admissions to the EMPC program: one where the specific combination of college and major is determined upon admission, and another where only the college is decided initially. For the latter, the student's major is determined after completing the preparatory studies and before entering the undergraduate phase. In this case, the decision on the major is based on the student's academic performance during the preparatory period, with higher-ranking students given priority in selecting their preferred majors.

preparatory program, students are officially enrolled in their admitted undergraduate or vocational colleges.

However, due to the significant advantages of the EMPC program, including lower admission thresholds compared to regular colleges, a higher likelihood of admission to more prestigious institutions, and the limited number of positions available per province, applying for the EMPC requires a well-considered strategy to maximize the chances of admission.[4] Given the highly competitive nature of higher education admissions in China, these preferential policies are crucial in shaping admission outcomes. Nevertheless, it remains unclear which students, particularly those from poor or rural areas, are most likely to benefit from the policy and how to effectively inform and engage ethnic minority students in utilizing it. This paper utilizes detailed administrative data from Ningxia, China, to offer causal evidence on these issues.

3 Data

3.1 Student-level Data

Ningxia, officially known as the Ningxia Hui Autonomous Region, is one of the most economically disadvantaged provinces in northwestern China, ranking third from the bottom in terms of total GDP in 2022. Remarkably, 35% of the province's population is Muslim. Our analysis utilizes student-level administrative data from high school graduation cohorts spanning from 2014 to 2018 in Ningxia, China.

We focus on students who graduated from traditional high schools with either STEM or non-STEM tracks and who participated in the National College Entrance Examination

[4]Table A.1 shows the enrollment plan for the Minority Preparatory Classes Program at regular higher education institutions in 2016.

(NCEE).[5,6] Only students who completed their high school education in Ningxia are included in the analysis. The dataset comprises a total of 235,692 students, of whom 75,645 are ethnic minority students, from 2014 to 2018, with relatively stable numbers across the years.[7,8] The dataset includes detailed demographic information such as gender, ethnicity, age, academic track, high school details, class identifiers, and the gender and occupations of the household head. Additionally, it contains comprehensive data on the NCEE, including all NCEE scores, college application records, college admission scores, and admission outcomes. This information allows us to identify the bonus points awarded to students.

Table 1 presents summary statistics for both Han majority and ethnic minority students. Han majority students tend to have larger class sizes compared to their ethnic minority counterparts, with an average of 70.53 students per class versus 65.18 for minority students. For both groups, female students constitute approximately 53-55% of the population. Over 20% are NCEE retakers, around 65% graduate from the STEM track, and about 20% are admitted to Tier 1 colleges. Notably, a higher proportion of ethnic minority students are admitted to elite colleges, specifically those under the Project "985/211" initiative. On average, ethnic minority students submit 6.4 college applications—more than the 4.3 applications submitted by Han majority students. Additionally, over 54% of ethnic minority students' household heads are farmers, while only 11% of the household heads are female. It is noteworthy that the average score exceeding the cutoff for each tier among Han majority students is 39 points, significantly higher than the 9.9 points observed for ethnic minority students. Among ethnic minority students, those admitted through the Ethnic Minority

[5]In China, graduates from various types of secondary schools—such as secondary normal schools (teacher training), other secondary schools, vocational high schools, technical schools, vocational (associate degree) programs, and bachelor's degree (or higher) programs—are also eligible to take the NCEE. However, this paper exclusively considers students from traditional high schools.

[6]Students applying to art or sports schools must also choose between STEM and non-STEM tracks and attend the NCEE.

[7]Specifically, there are 47,240 students in 2014, 47,627 students in 2015, 48,840 students in 2016, 46,898 students in 2017, and 45,087 students in 2018.

[8]In China, students are required to take the NCEE in their hukou (household registration) location. Therefore, some students may attend high school in locations different from where they are registered. However, for this study, we only include those who completed their high school education in Ningxia.

Priority College (EMPC) program are twice as likely to gain admission to Tier 1 colleges and are more frequently accepted into elite colleges (see Figure 2).

3.2 Admission Results

Figure 1 shows the distribution of Han majority and ethnic minority students admitted to colleges by tier. The majority of both Han and ethnic minority students are admitted to junior colleges, underscoring the intense competition of the NCEE in China. While Han majority students are relatively evenly distributed across Tier 1, Tier 2, and Tier 3 colleges, a higher proportion of ethnic minority students were admitted to Tier 2 colleges in 2014 and 2015, with a notable shift toward Tier 1 admissions beginning in 2016. Additionally, when comparing ethnic minority students admitted to colleges through the EMPC program to those admitted without it, the distribution across college tiers remains relatively stable over the years. However, there has been a sharp increase in the admission of ethnic minority students to Tier 1 colleges through the EMPC program since 2016 (see Figures 2 and 3). This rise in Tier 1 admissions through EMPC accounts for the overall increase in Tier 1 admissions among ethnic minority students.[9] This also highlights the significant advantage provided by the EMPC program for ethnic minority students in college admissions.

3.3 NCEE Performance

Educational achievement and educational opportunity are two important measures of educational inequality (Ferreira and Gignoux, 2014). Standardized test scores serve as a valuable

[9]Since 2016, a significant shift in the share of ethnic minority students admitted to Tier 1 and Tier 2 colleges has occurred, driven by higher education reforms initiated in 2015. In September 2014, the State Council issued the "Implementation Opinions on Deepening the Reform of the Examination and Enrollment System," which proposed the gradual elimination and merging of college admission tiers. Beginning in 2011, provinces such as Shanxi, Shandong, and Fujian merged their second and third tiers. In 2015, Sichuan, Guangxi, Zhejiang, and Tianjin followed suit. In 2017, Beijing merged its second and third tiers, and Shandong and Hainan merged their first and second tiers. Although Ningxia only began merging its second and third tiers in 2019, these reforms in other provinces have influenced the definition of college admission tiers, leading to an increase in the number of ethnic minority students entering Tier 1 universities through preparatory classes.

indicator for assessing students' achievements and play a significant role in shaping post-secondary education choices and opportunities (Venti and Wise, 1982). Figure 4 illustrates the distribution of NCEE raw scores for both Han majority and ethnic minority students across STEM and non-STEM tracks. The distribution of raw scores for Han majority and ethnic minority students is similar across different college tiers, with scores for students admitted to Tier 2 colleges being the most concentrated. However, ethnic minority students generally display slightly lower central scores compared to Han majority students. The overlaps in score distributions across different tiers underscore the importance of effective college application strategies. Even students with higher NCEE scores who meet the requirements for higher-tier colleges may fail to gain admission due to imperfect application strategies, which could stem from an inaccurate understanding of the application landscape or insufficient information about application and admission policies. Additionally, the greater overlap between Tier 1 and Tier 2 college admissions for ethnic minority students highlights the impact of ethnicity-based affirmative action policies. Given similar NCEE performance, ethnic minority students may achieve better admission outcomes by leveraging the benefits of preferential policies.

As one of the most prominent affirmative action policies in higher education in China, the bonus points policy plays a crucial role in college admissions. While most students benefiting from this policy are ethnic minorities, a very small proportion of Han majority students also receive bonus points. In Ningxia, the bonus points are categorized into three levels: 5 points, 10 points, and 20 points. Figure 5 shows the proportion of students who receive bonus points. The majority of ethnic minority students are awarded 20 bonus points, while nearly all Han majority students are unable to benefit from this policy.[10,11] However, after the adjustment for bonus points, the central scores of the adjusted score distributions for Han majority and ethnic minority students become more similar (see Figure 6), indicating that the bonus points policy helps to mitigate educational disparities between Han majority and ethnic minority

[10]Between 2014 and 2018, 97.15% of ethnic minority students received 20 bonus points.

[11]During the same period, only 4% of Han majority students benefited from bonus points in college admissions. Among these, 1% received 5 points, 2% received 10 points, and only one Han student had 10 points deducted when admitted to college.

students to some extent.

Even though ethnic minority students applying to college through the EMPC program can simultaneously benefit from the bonus points policy, final admissions to EMPC programs are determined solely by NCEE raw scores and applicant rankings.[12] Figure 8 shows the difference between the cutoff scores for each tier and the NCEE raw scores for ethnic minority students. Compared to ethnic minority students who are not admitted through the EMPC program, most students who enter college through the EMPC program have NCEE raw scores that fall below the cutoff scores. The score differences for Tier 1 and Tier 2 colleges are concentrated between -50 to 0 points. For top performers, the EMPC program allows admission to elite schools with much lower scores.[13] Thus, the EMPC program provides ethnic minority students with better opportunities to access higher-quality education.

4 Empirical Analysis

4.1 Identifying Peers

This study examines whether peers within students' networks influence their decisions to apply to and gain admission into college through the EMPC, a program specifically designed for ethnic minority students. When an ethnic minority student is successfully admitted to an ethnic preparatory class program, their success may disseminate through school or neighborhood networks, or among students sharing the same teacher. This shared information can subsequently shape the application behaviors of other students within these networks.

Figure 11 illustrates the ratio of ethnic minority students admitted to the EMPC across counties, while Figures 12 and 13 depict the admission ratios at the school and class levels, as

[12]Figure 7 illustrates the bonus points received by ethnic minority students who benefited. Regardless of whether students are admitted through the EMPC program, the majority receive 20 bonus points.

[13]Figure 9 shows the difference between the NCEE raw scores and the lowest admitted score at the college where ethnic minority students were ultimately admitted. Figure 10 displays the difference between the NCEE raw scores and the average NCEE scores of all admitted students at the colleges where ethnic minority students were admitted. Ethnic minority students require relatively lower scores for college admission through the EMPC program.

well as among students sharing the same teacher.[14] The data reveal considerable variation, with some counties showing a higher proportion of ethnic minority students admitted through the EMPC, while others exhibit lower proportions or none at all. A similar pattern is observed at the school level and among students with the same teacher. These findings strongly support the validity of the peer group definitions. Accordingly, peer groups are categorized based on: (1) ethnic minority students who graduated in the previous year but reside in the same county as the current year student; (2) students from the previous cohort who reside in the same registered residences (similar to blocks); (3) students from the previous cohort who attended the same high school; (4) students from the previous cohort who attended the same high school and shared the same head teacher; (5) students from the previous cohort who share the same registered residence and high school; (6) students from the previous cohort who share the same block and head teacher; and (7) students from the previous cohort who come from the same county and share the same head teacher. Table 4 provides details on the number of students and the maximum capacity for each of the seven peer group categories. The largest peer group consists of ethnic minority students residing in the same county, with the largest subgroup including 2,456 students. In contrast, the smallest peer group, comprising students from the same block who share the same teacher, has a maximum size of only 41 students.

However, In China, head teachers typically remain with the same cohort of students throughout Grades 10 to 12, making it unlikely, though still possible in some cases, for students to share the same teacher with peers who graduated in the previous year. Therefore, this paper defines three primary peer group types: (1) students who graduated in the previous year but resided in the same block as the current year student; (2) students from the previous cohort who share the same block; and (3) students from the previous cohort who attended the same high school.[15]

The peer group comprising ethnic minority students from the same school consists of 415

[14] In Ningxia, there are 22 counties, 235 registered residences (similar to blocks), and 138 regular high schools.

[15] As part of the robustness checks, this study also considers alternative peer group definitions that account for students sharing the same head teacher, details are provided in Section 5.

groups, while the category of peers from the same block who attended the same high school includes 8,954 peer groups. Based on these definitions, peer effects are measured by whether at least one student within a peer group was admitted to the EMPC in college:

$$Peers_{ip(t-1)} = \begin{cases} 1 & \text{if at least one peer of student } i \text{ from group } p \text{ in year } (t-1) \\ & \text{was admitted to the EMPC,} \\ 0 & \text{otherwise.} \end{cases} \tag{1}$$

By leveraging cohorts from previous graduating years, this approach partially mitigates the issue of reflection bias.

4.2 Baseline Results

To explore the relationship between students' EMPC admission outcomes and their peers, we conduct a basic Ordinary Least Squares (OLS) regression:

$$\begin{aligned} EMPC_{ispt} = \alpha + \beta Peers_{ip(t-1)} + \gamma_1 Std\_NCEE_{it} + \gamma_2 \overline{Peers\_Std\_NCEE_{ip(t-1)}} \\ + X'_{it}\Omega + \mu_{is} + \tau_t + \epsilon_{ispt} \end{aligned} \tag{2}$$

where $EMPC_{ispt}$ is a binary indicator variable that equals 1 if student i in school s in year t with peer group p was admitted to college through the EMPC. $Peers_{ip(t-1)}$ represents the peer effects indicator, which equals 1 if at least one peer of student i in year t from peer group p in year $(t-1)$ was admitted to the EMPC. Std_NCEE_{it} is the standardized NCEE score for student i. $\overline{Peers\_Std\_NCEE_{i(t-1)p}}$ denotes the average standardized NCEE score of peers in group p in year $t-1$, excluding the score of student i.

Finally, X'_i is a vector of control variables that includes indicators for STEM track enrollment, Hui nationality, rural residency, age, poor county status, high school size, class size, and whether the household head is female or a farmer for student i in year t. μ_{is} denotes high school fixed effects, and τ_t represents year fixed effects.

Figure 14 presents the baseline regression estimates from Equation 2. While peers residing

in the same block show a positive relationship with the current ethnic minority students' EMPC program admissions, and peers from the same school exhibit a negative relationship, these results are statistically insignificant. This may be because students tend to spend more time with classmates at school, limiting interactions with peers outside their immediate class environment. Additionally, students often have fewer opportunities to communicate with peers from different grades, particularly for Grade 12 students who face the intense pressure of the NCEE.

However, a significant negative relationship is observed for STEM track students and their peers who graduated from the same school: a 1% increase in peers' admissions to the EMPC program is associated with a 3.82% decrease in admissions among STEM track students. This may be attributed to the higher proportion of STEM track students in high schools, which intensifies competition for EMPC program placements.[16]

When examining peers who share both the same block and school, a positive and statistically significant association emerges. Specifically, having at least one peer admitted to the EMPC program increases a student's likelihood of admission by 1.41%. The heterogeneity analysis reveals that male students and non-STEM track students show stronger associations with their peers' admissions. For instance, non-STEM track students are 1.75% more likely to gain admission through the EMPC program. This may stem from the closer and more specific networks formed through the intersection of school and residence, which foster stronger connections, enhance confidence, and facilitate the sharing of "beneficial" information.

4.3 Diff-in-Diff Framework

To investigate the causal impact of peers' admissions on students' admissions to colleges through the EMPC program, we employ the Difference-in-Differences (DID) approach. Ethnic minority students are conditionally eligible to apply to colleges through the EMPC program if their NCEE raw scores are no more than 80 points below the cutoff scores for Tier 1, Tier

[16]Figure 15 shows the distribution of STEM and non-STEM track high school students in Ningxia. Both Han majority and ethnic minority students have a higher proportion enrolled in the STEM track.

2, and Tier 3 colleges. Table 5 presents the cutoff scores for each college tier and academic track. These cutoff scores are determined by students' NCEE raw scores, rankings, and the enrollment plans for each college tier in each province and year.

Specifically, the education examination authorities in each province and city set the number of students planned for admission to each tier. These quotas are then matched with students' score rankings, and the scores of the last students within the quota determine the cutoff scores. Since these cutoff scores change annually and are determined by external factors such as enrollment plans and the distribution of student performance, the determination of score cutoffs is exogenous. Consequently, whether individual students meet the required scores is also exogenous. Ethnic minority students are defined as eligible applicants if their NCEE scores, plus 80 points, meet or exceed the cutoff score for each tier, plus 80 points, meet or exceed the cutoff score for each tier. However, as Tier 1 colleges have the highest thresholds for both STEM and non-STEM tracks, the pool of eligible applicants for Tier 1 colleges remains unaffected by those eligible for other tiers. Accordingly, this study focuses exclusively on Tier 1 eligible applicants to examine the peer effects on their admissions to college through the EMPC program.

Figure 16 presents the regression discontinuity plots for STEM and non-STEM track students separately, illustrating the relationship between the distance of students' NCEE raw scores from the Tier 1 cutoff scores across different years. The plots exhibit clear discontinuities at the Tier 1 cutoff scores, supporting the exogeneity of eligibility for the EMPC program. Furthermore, since ethnic minority students' admissions to the EMPC program are primarily determined by their NCEE scores, students who graduated in the previous year do not influence the NCEE performance or program application decisions of current-year students. This renders admissions to the EMPC program in the previous year exogenous to current admissions, and defining peers as students who graduated in previous years helps partially address the reflection problem.

As a result, the factors influencing students' applications and admissions to the EMPC

program include their eligibility status and the presence of peer(s) within their networks who have been admitted to the program. Using this framework, we estimate the effects of peer admissions to the EMPC program as follows:

$$EMPC_{ispt} = \alpha + \beta_1 PeersEMPC_{ip(t-1)} \times Elig_{it} + \beta_2 PeersEMPC_{ip(t-1)} + \beta_3 Elig_{it} + X'_{it}\Omega + \mu_{is} + \tau_t + \epsilon_{ispt} \quad (3)$$

where $EMPC_{ip}$ indicates whether student i was admitted to college through the EMPC program. $PeersEMPC_{pi}$ represents the presence of at least one peer in peer group p who graduated in the previous year and was admitted to college through the EMPC program. $Elig_{it}$ is a binary variable indicating eligibility to apply for the EMPC program, which equals one if student i's NCEE raw scores are higher than the cutoff scores minus 80 points for tier 1 college. $X'i$ is a vector of control variables as previously described. μ_i represents the high school fixed effect, while τ_t refers to the year fixed effect. The coefficient of interest, β_1, captures the peer effects on ethnic minority students' admissions to colleges through the EMPC program.

Figure 17 presents the results of the DID analysis. While peers who graduated from the same school do not significantly influence students' admissions to the EMPC program, peers residing in the same block significantly and positively increase the likelihood of admission for ethnic minority students. When the peer group definition is extended to include the interaction between residence and school—peers residing in the same block and graduating from the same school—peers continue to have a significant impact. Specifically, a 1% increase in peers' admissions to the EMPC program results in a 2.49% increase in students' admissions.

Consistent with the baseline results, male students and non-STEM track students experience greater benefits, with their likelihood of admission increasing by 3.13% and 3.12%, respectively. This may be attributed to the higher proportion of female students admitted to the EMPC program each year, regardless of academic track (see Figure 18), which amplifies the relative impact on male students. Similarly, the larger proportion of STEM track students

(see Figure 19) may lead to more efficient information dissemination among non-STEM students.

The findings highlight the combined effects of social networks within the same residence and high school, where students can more easily access critical information about specialized programs that support their higher education decisions and outcomes. These networks foster familiarity with students' NCEE performance and admission results, enabling stronger connections among students, even across graduating cohorts. This familiarity enhances the influence of peer networks over time, facilitating the dissemination of valuable information and support.

5 Robustness

To verify the robustness of our previous estimates, we expand the analysis by redefining the criteria used to identify peer groups and examining how variations in these definitions affect the results. Additionally, we investigate the accumulated effects of peers over time by incorporating a broader set of peer interactions and connections, considering both the spatial and academic dimensions of their influence. This comprehensive approach allows us to assess whether the observed peer effects remain consistent under alternative definitions and over extended periods, thereby ensuring the reliability and validity of our findings.

5.1 Peer Group Redefinition

We first broaden the residence scale from the block level to the county level and include the combination of county and school. Additionally, head teachers, who often possess extensive knowledge of students' abilities, likely NCEE performance, target colleges, and application strategies, play a crucial role in guiding students' college applications. Head teachers are well-informed about both current and previous students' college application and admission outcomes. Therefore, we incorporate sharing the same head teacher as an additional indicator

in the peer group definition.

Figure 20 presents the robustness check results of the DID analysis. Peers from the same county show strong and significant impacts on ethnic minority students' admissions to the EMPC program, even when combined with peers from the same school. However, when the influence of sharing the same head teacher is included and combined with other indicators, peers no longer exhibit significant impacts. This may be due to the fact that only a small number of head teachers continue teaching Grade 12 in subsequent years. Typically, after a cohort graduates, head teachers transition to teaching the new Grade 10 cohort in the following academic year, rather than continuing with new Grade 12 students. Consequently, when limiting peers to those who graduated in the previous year, it becomes challenging for students to have the same head teacher and access up-to-date information about the EMPC program's application and admission processes.

5.2 Accumulated Peer Effect Analysis

To explore the peer effects over multiple years, we examine the cumulative impact of peers across different time frames. Specifically, we define peer effects based on students who have peers within their peer group who graduated two, three, or four years prior. Figure 21 illustrates the impacts of peers from the previous two years, Figure 22 from the previous three years, and Figure 23 from the previous four years. The results reveal a decline in peer effects as more years are included for peer groups defined as those residing in the same block and graduating from the same high school. Interestingly, female students and STEM-track students exhibit stronger cumulative peer effects, which contrasts with the main DID estimates. This may be attributed to the higher proportion of female and STEM-track students admitted to colleges through the EMPC program, amplifying the observed cumulative peer effects in these cases.

6 Conclusion

Educational disparities across race and ethnicity have garnered significant attention, yet the gaps within these groups warrant equal consideration. In this paper, we examine ethnic minority students in one of China's poorest provinces and their participation in an underexplored affirmative action program. Our analysis sheds light on how to improve higher education choices and outcomes for these students. By treating peers in students' networks within their residences and schools as important conduits of information, we investigate how peers influence minority students' participation in affirmative action programs in higher education.

Using student-level administrative data from the National College Entrance Examination (NCEE) in one of China's poorest provinces between 2014 and 2018, our findings highlight the critical role of peer networks in shaping the higher education outcomes of ethnic minority students, who often face barriers in accessing information about programs designed to benefit them. Specifically, the admission of peers to affirmative action programs in higher education has a positive and significant influence on the admission outcomes of ethnic minority students. This effect is consistent across both female and male students, as well as STEM and non-STEM track students, underscoring the universal importance of peer influence in guiding application decisions and fostering participation in affirmative action programs targeted at ethnic minorities.

By emphasizing the importance of peer networks, this study contributes to a deeper understanding of the social dynamics that shape educational decisions within disadvantaged communities. The findings highlight the potential of leveraging peer influence to improve access to higher education, demonstrating how social connections can serve as powerful tools to reduce educational disparities. These insights align closely with the United Nations Sustainable Development Goal (SDG) 4, which seeks to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all by 2030. Achieving this goal requires that all social classes, genders, and ethnic groups have equal access to

high-quality education. Policymakers might consider incorporating peer effects into the design and implementation of education policies, thereby enhancing the positive impacts of affirmative action programs. By addressing intra-group disparities and harnessing the power of peer networks, affirmative action programs can be further optimized to advance educational equity and contribute to the realization of SDG 4's transformative vision.

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7 Figures

Figure 1: Admission to College by Tier: 2014-2018

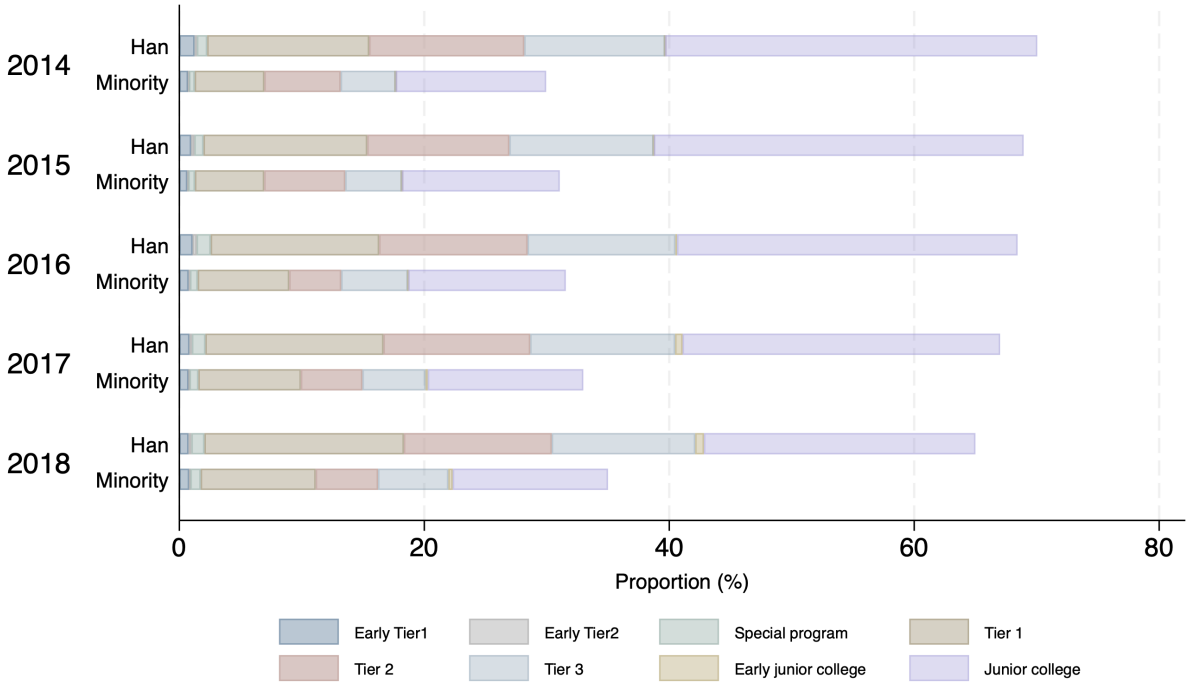


Figure 2: Admission of Minorities by College Tier: 2014-2018

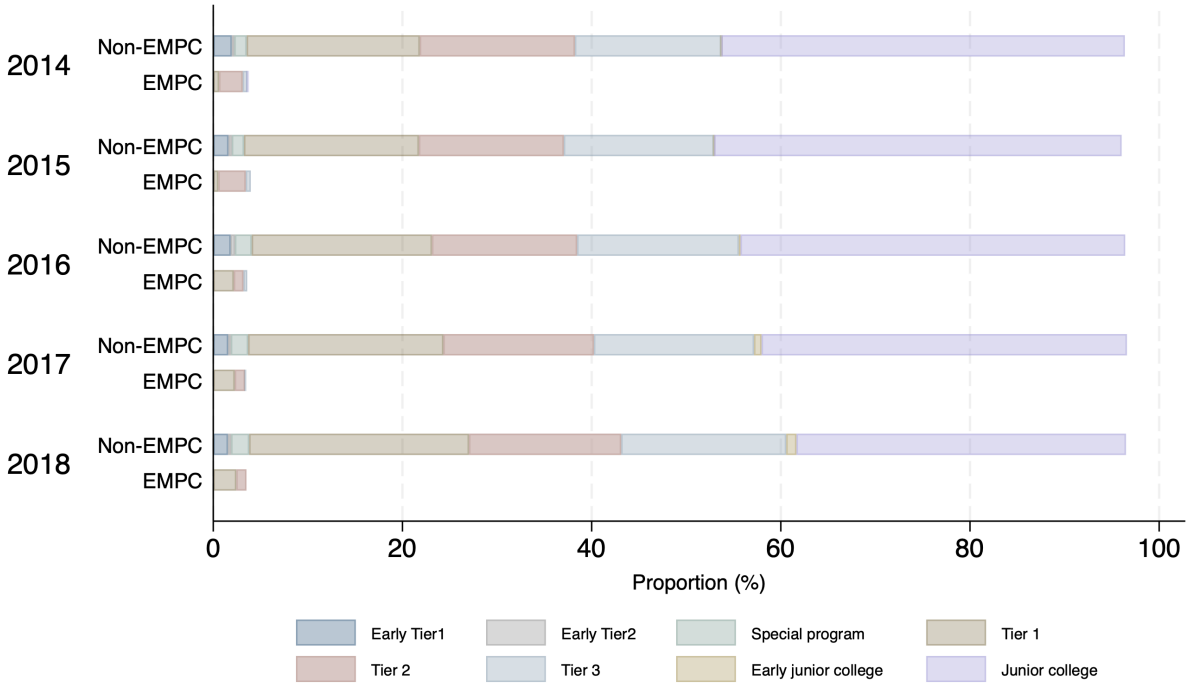


Figure 3: Admission to College through EMPC by Tier: 2014-2018

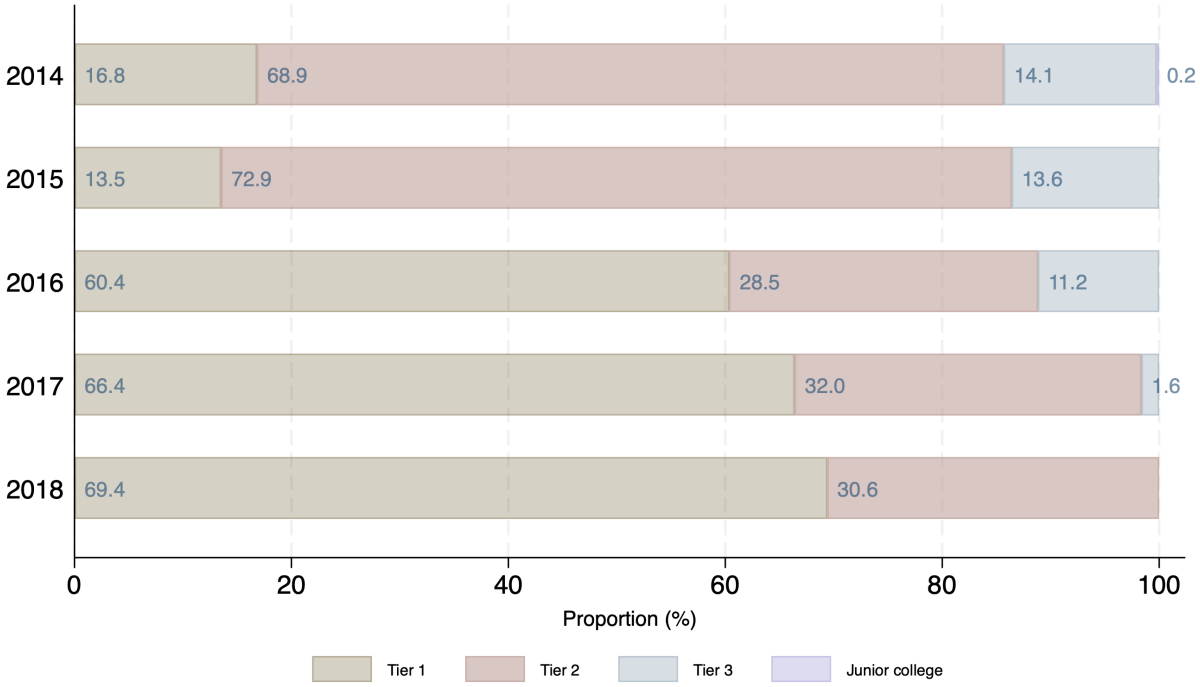


Figure 4: NCEE Raw Scores by Track and Tier: 2014-2018

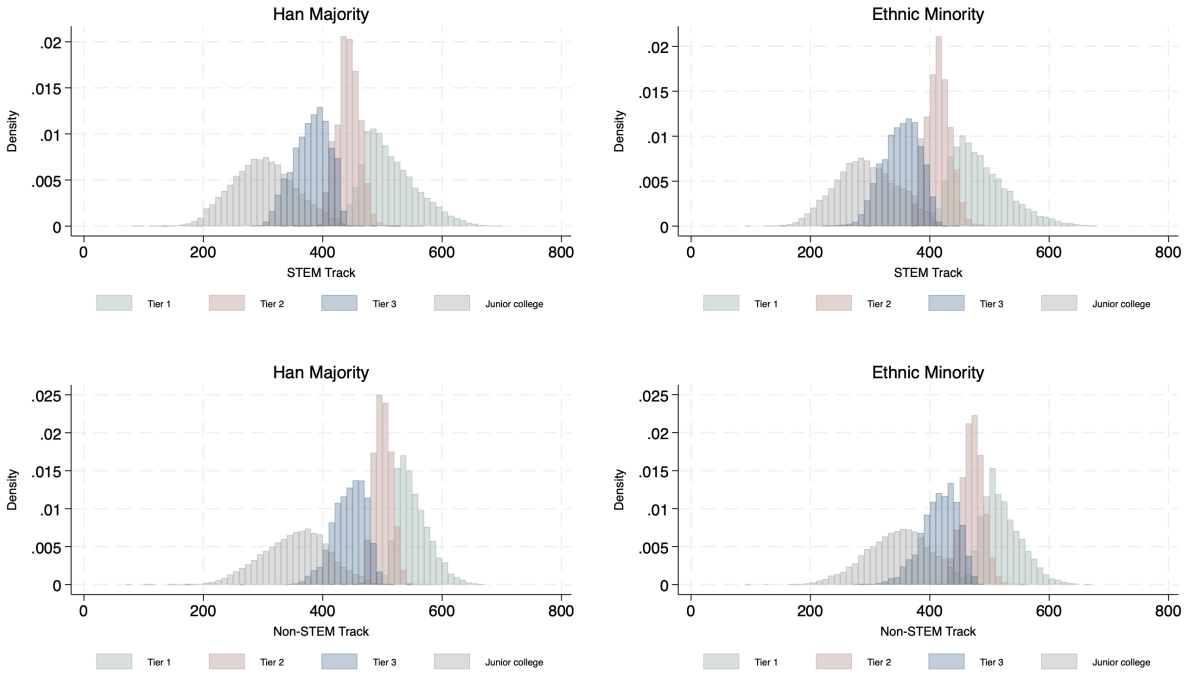


Figure 5: Distribution of Bonus Points Among Admitted Minorities: 2014-2018

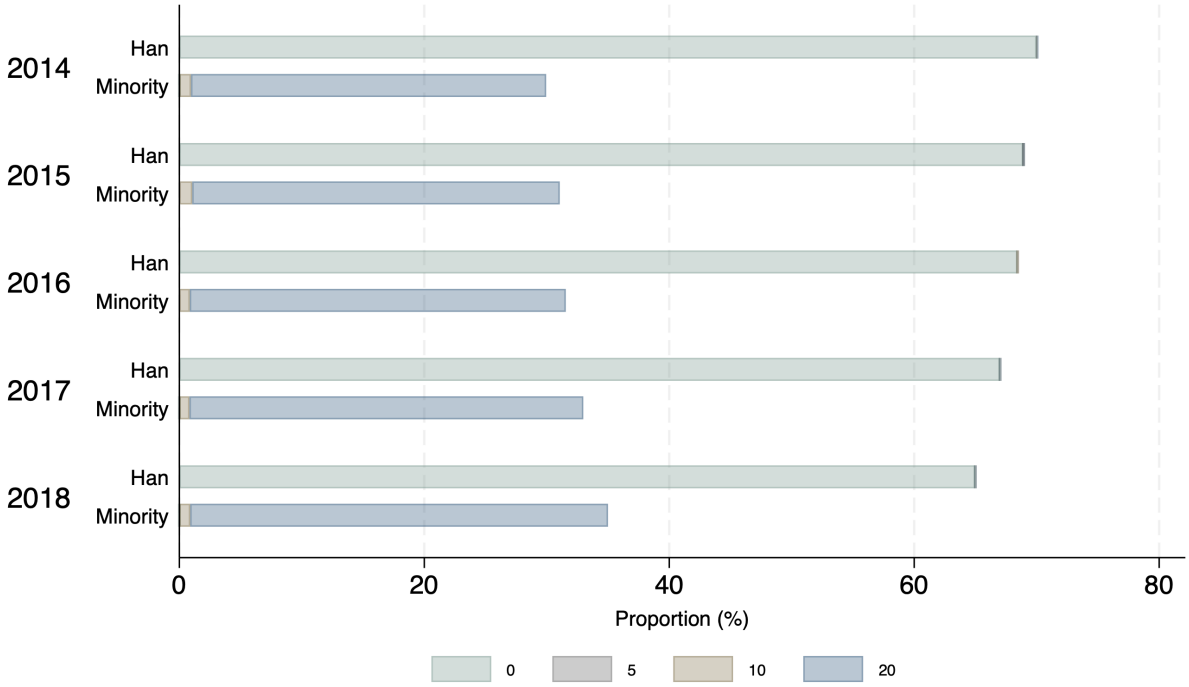


Figure 6: NCEE Adjusted Scores by Track and Tier: 2014-2018

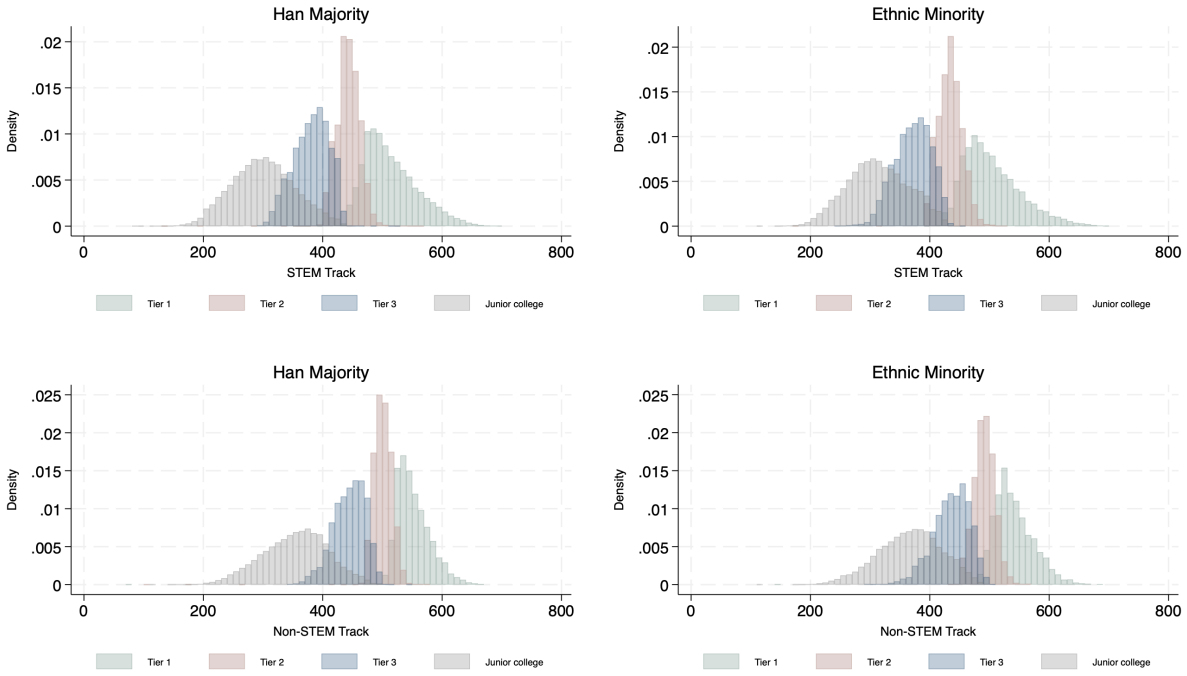


Figure 7: Distribution of Bonus Points Among Minorities Admitted to EMPC: 2014-2018

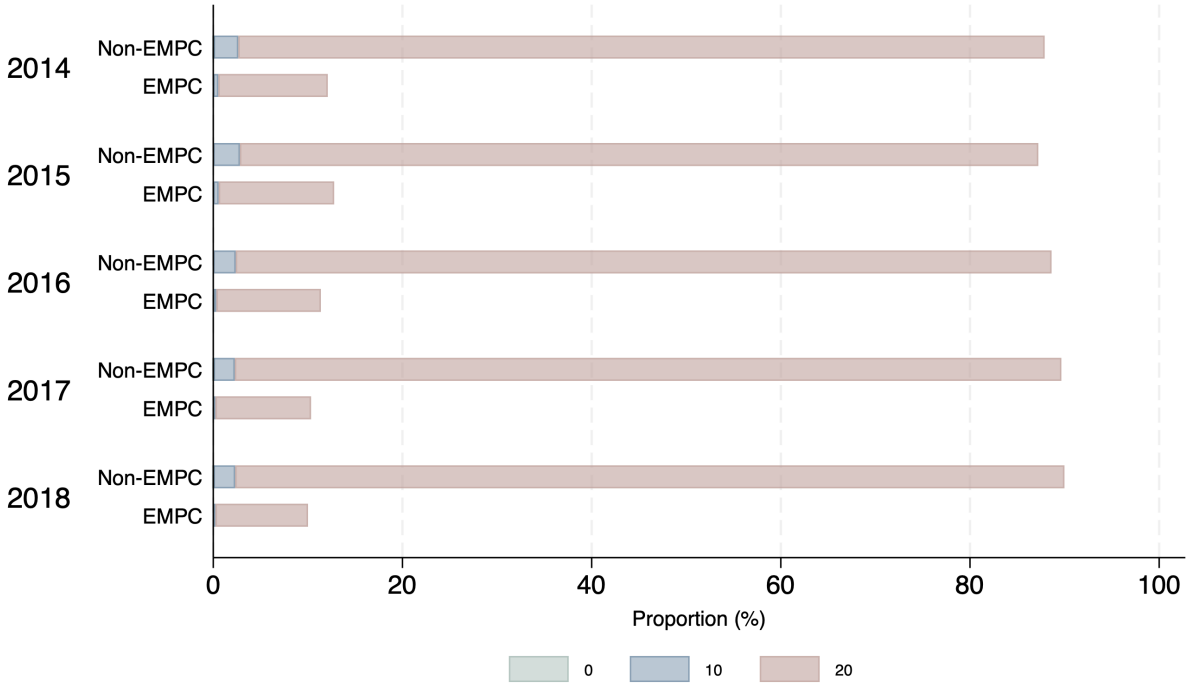


Figure 8: Difference between Cutoff Scores and NCEE Raw Scores by Tier: Ethnic Minorities, 2014-2018

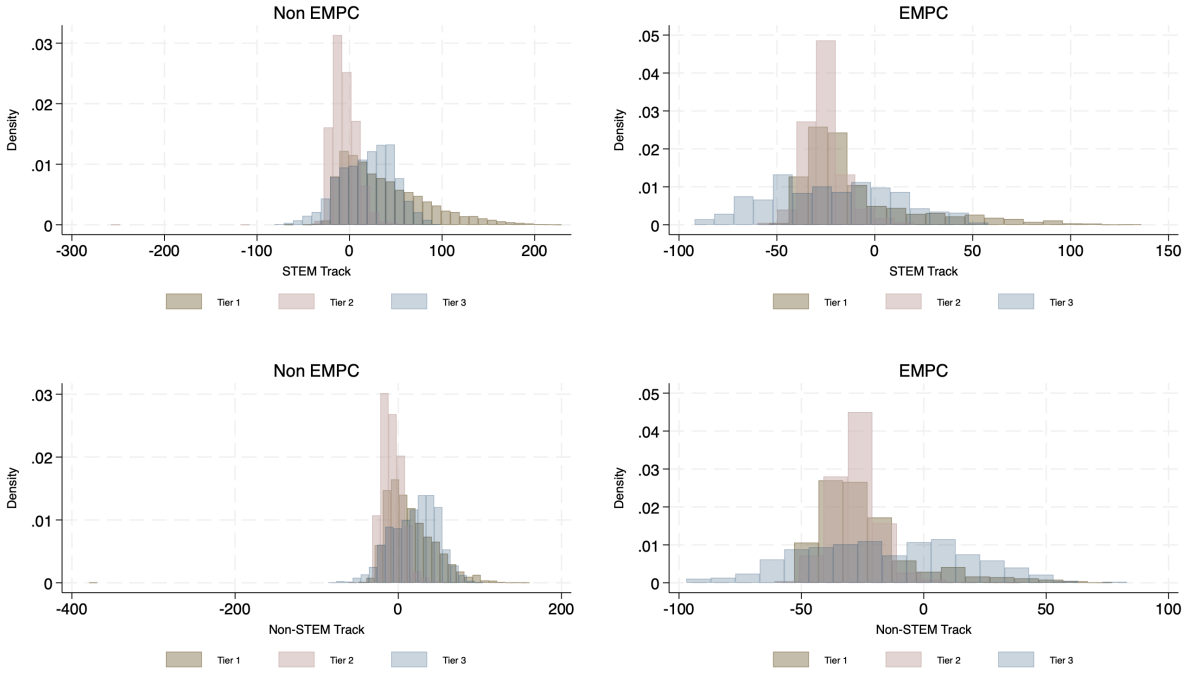


Figure 9: Difference between NCEE Raw Scores and the Lowest Admitted Score at College Level: Ethnic Minorities, 2014-2018

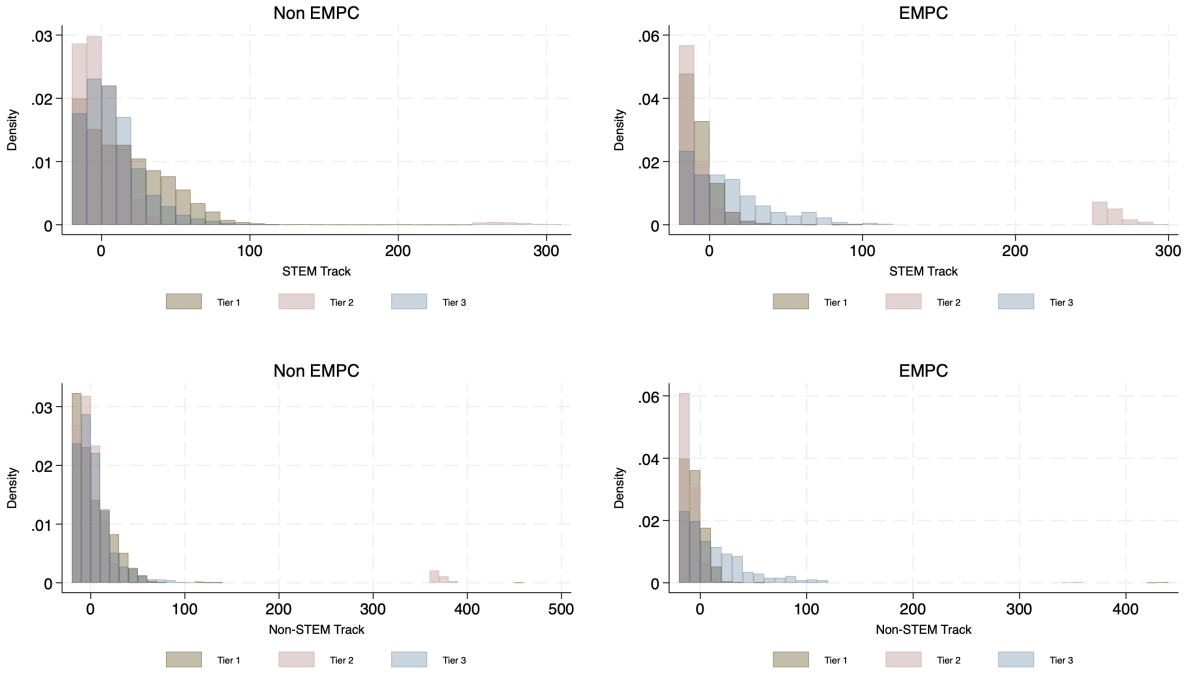


Figure 10: Difference between NCEE Raw Scores and the Mean Admitted Score at College Level: Ethnic Minorities, 2014-2018

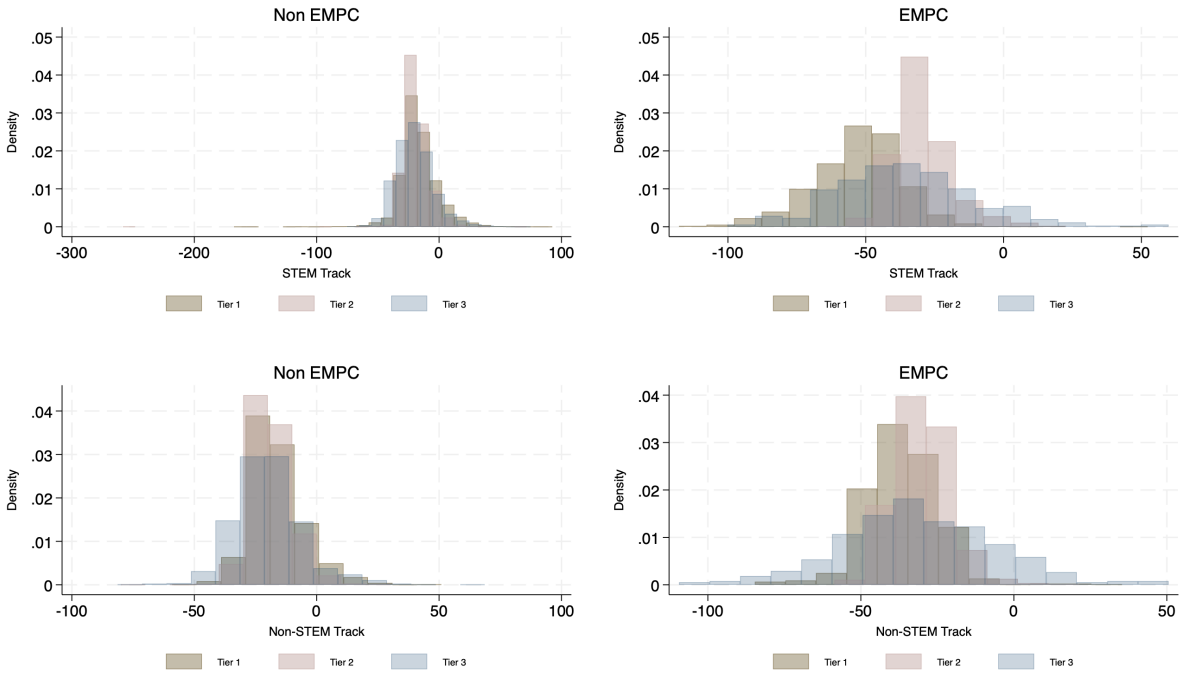


Figure 11: Admissions to EMPC by County

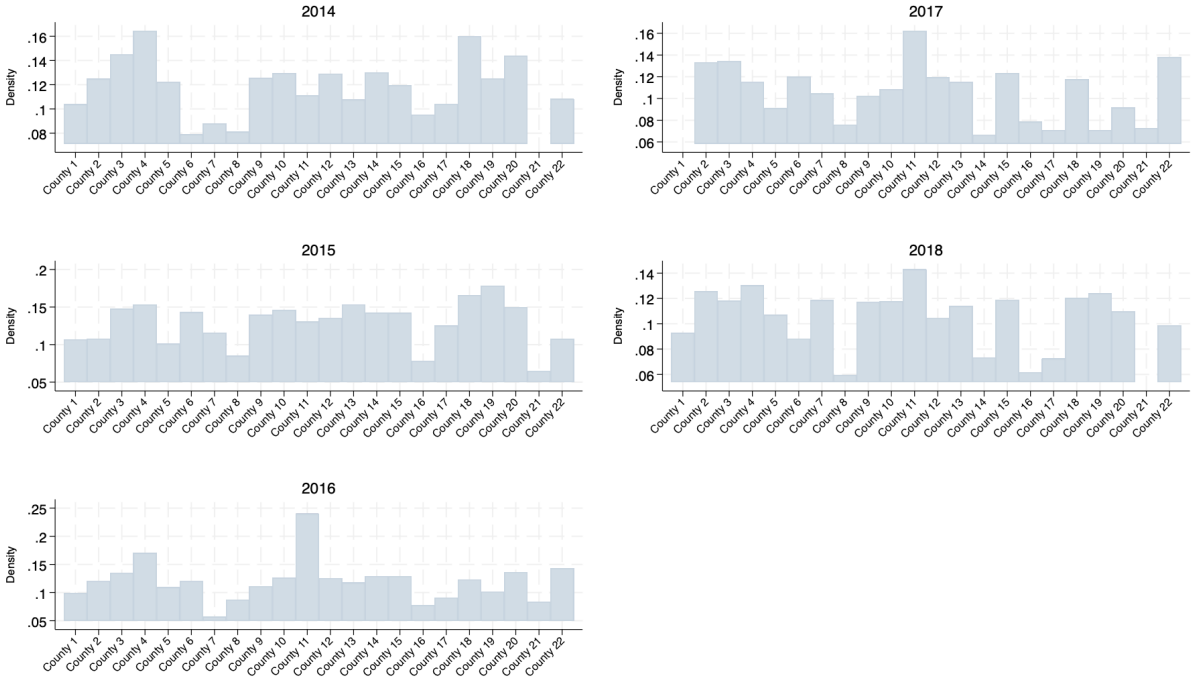


Figure 12: Admissions to EMPC by School

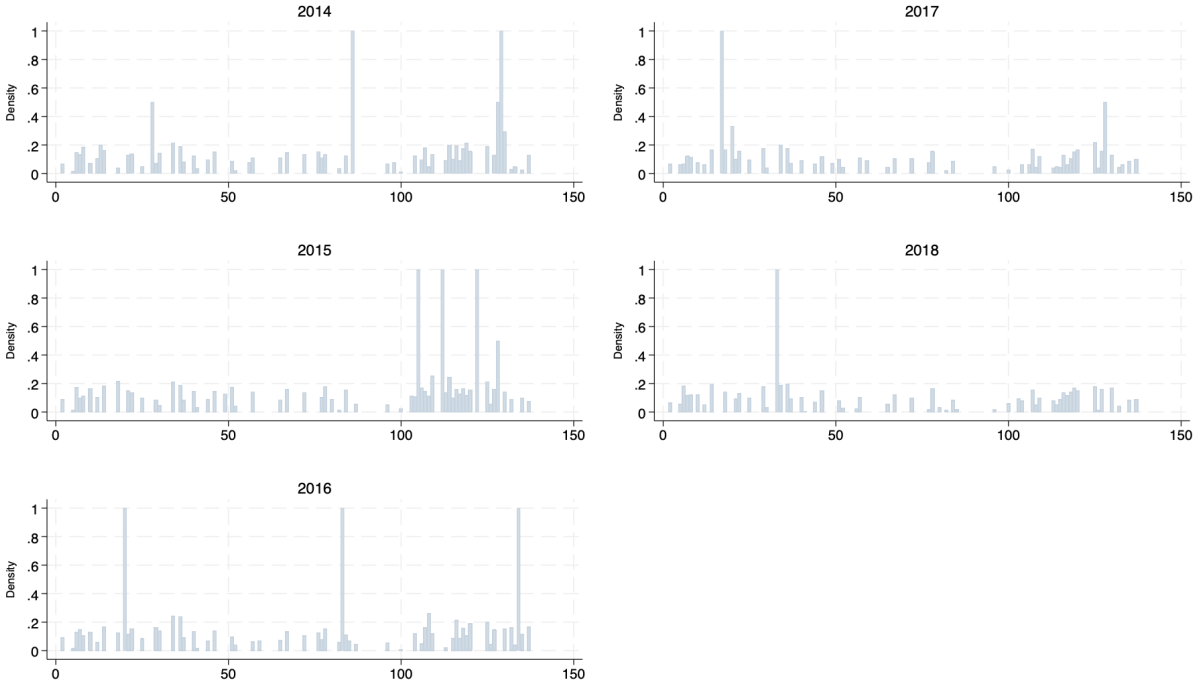


Figure 13: Admissions to EMPC by Teacher

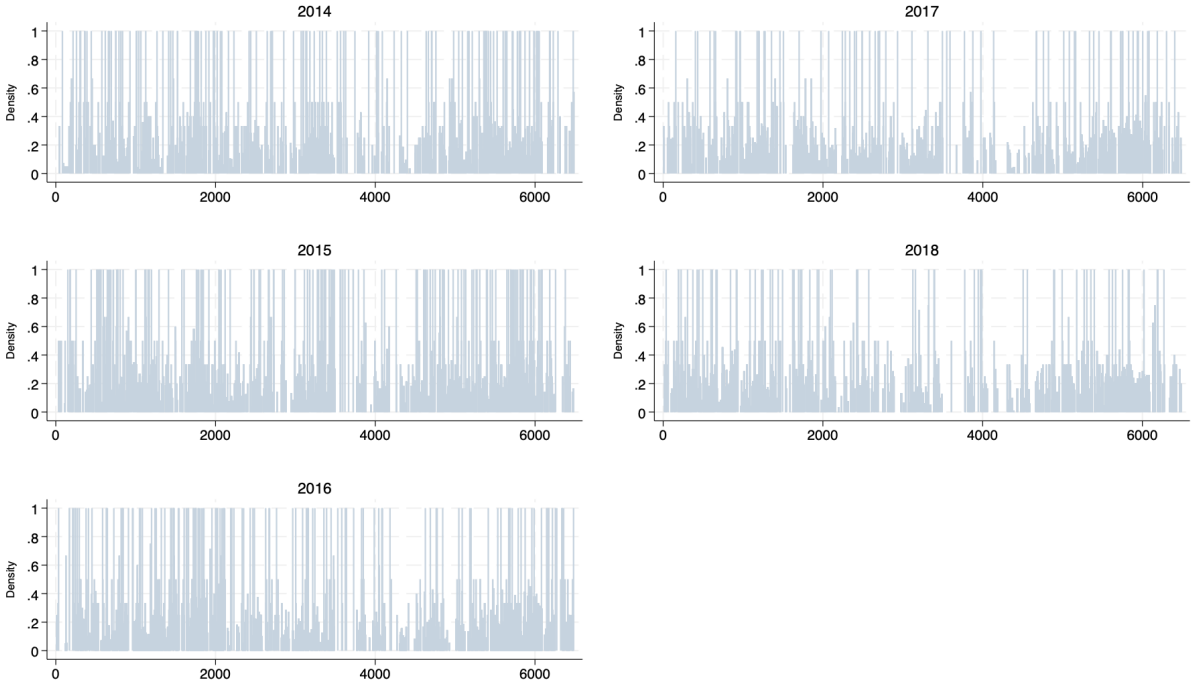
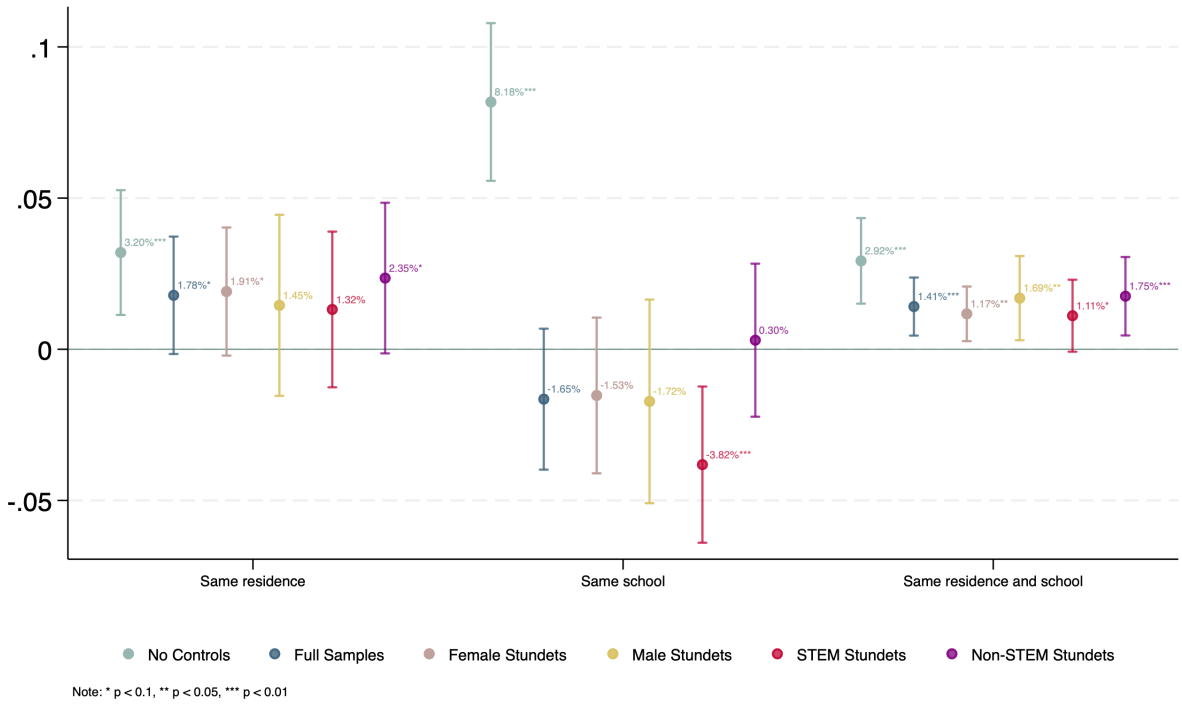


Figure 14: Baseline Results: Peers from the Cohort of the Previous Year



Note: * p < 0.1, ** p < 0.05, *** p < 0.01

Figure 15: High School Academic Track Distribution: 2014–2018

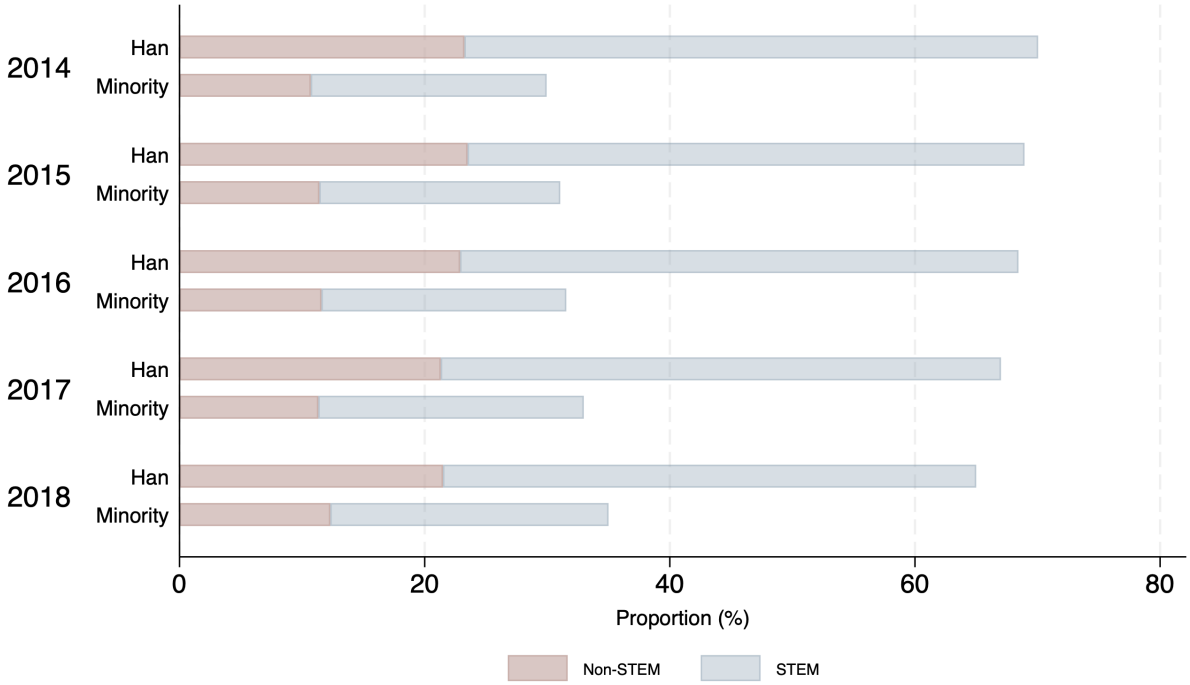


Figure 16: RD Plot: Exogenous Determination of EMPC Eligibility

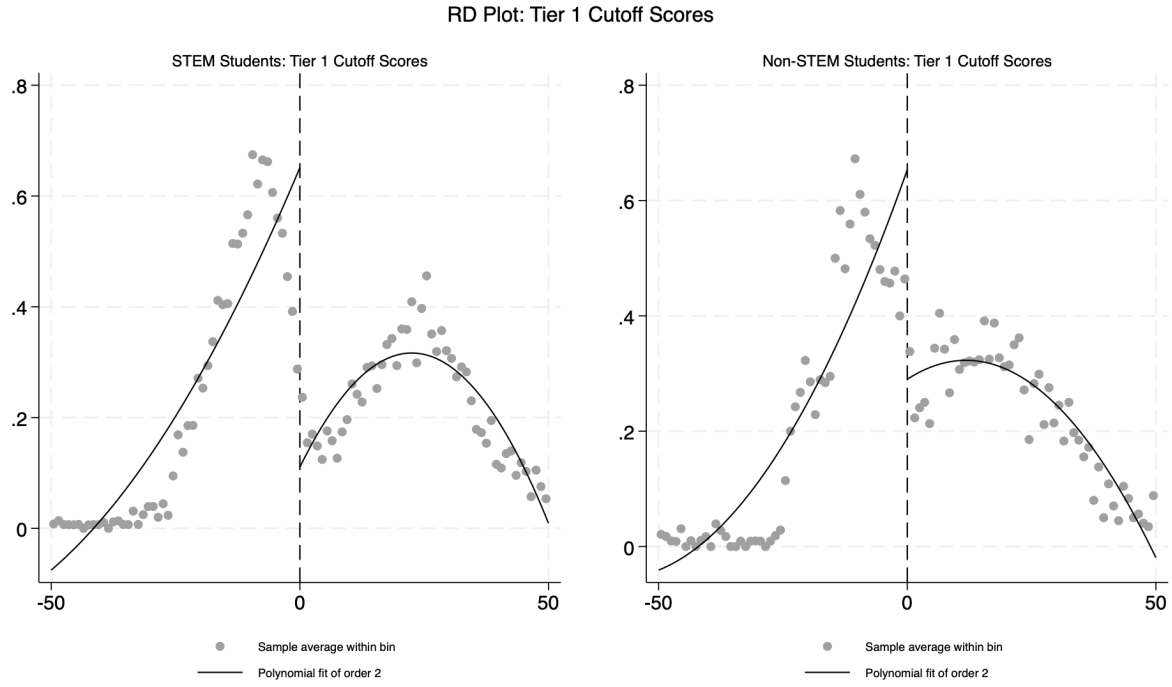
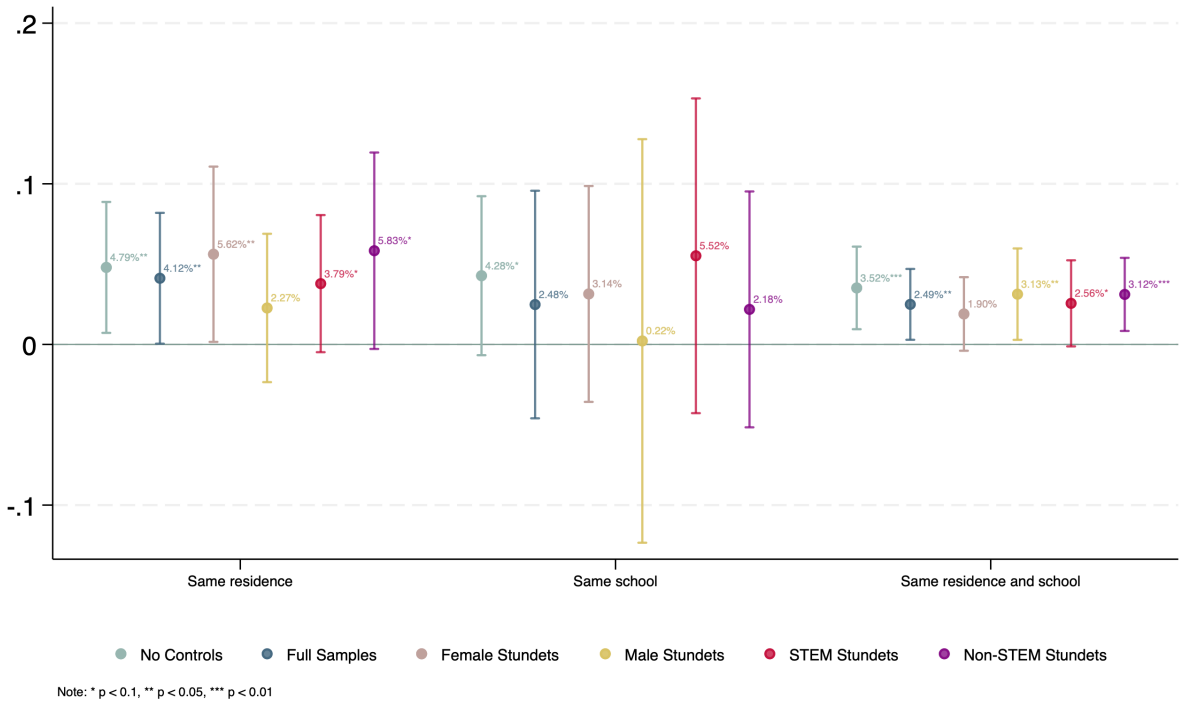


Figure 17: DID Results: Peers from the Cohort of the Previous Year



Note: * p < 0.1, ** p < 0.05, *** p < 0.01

Figure 18: Distribution of Ethnic Minority Students in Tier 1 Colleges by Gender: 2014-2018

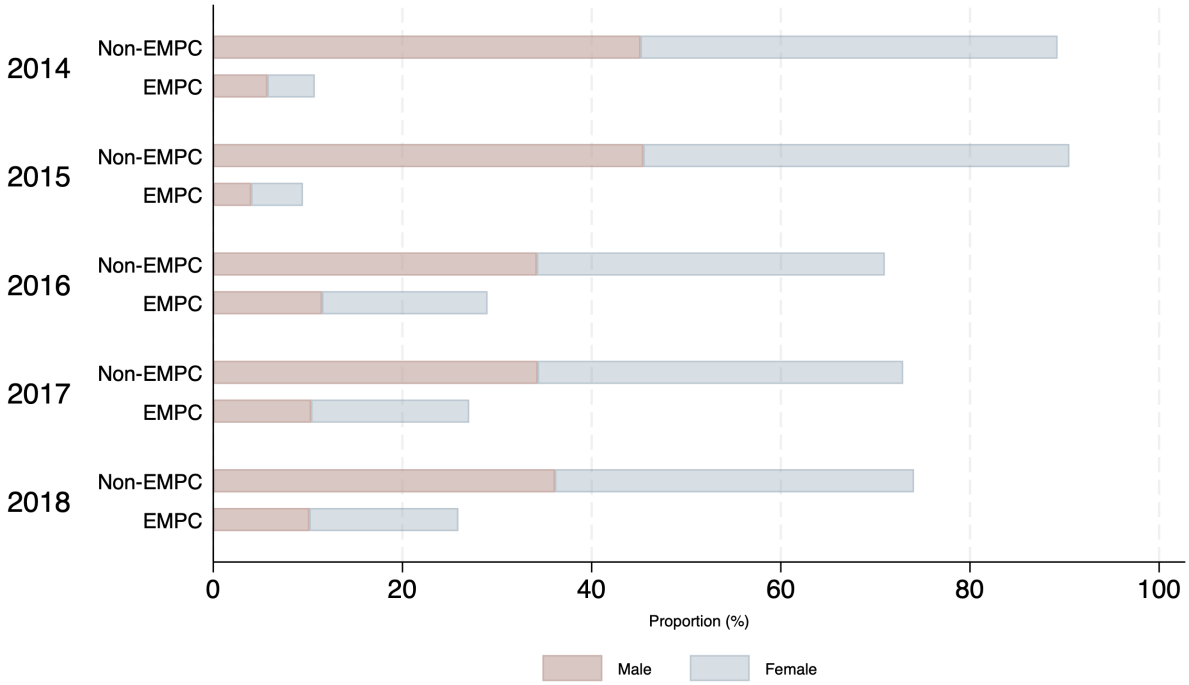


Figure 19: Distribution of Ethnic Minority Students in Tier 1 Colleges by Academic Track: 2014-2018

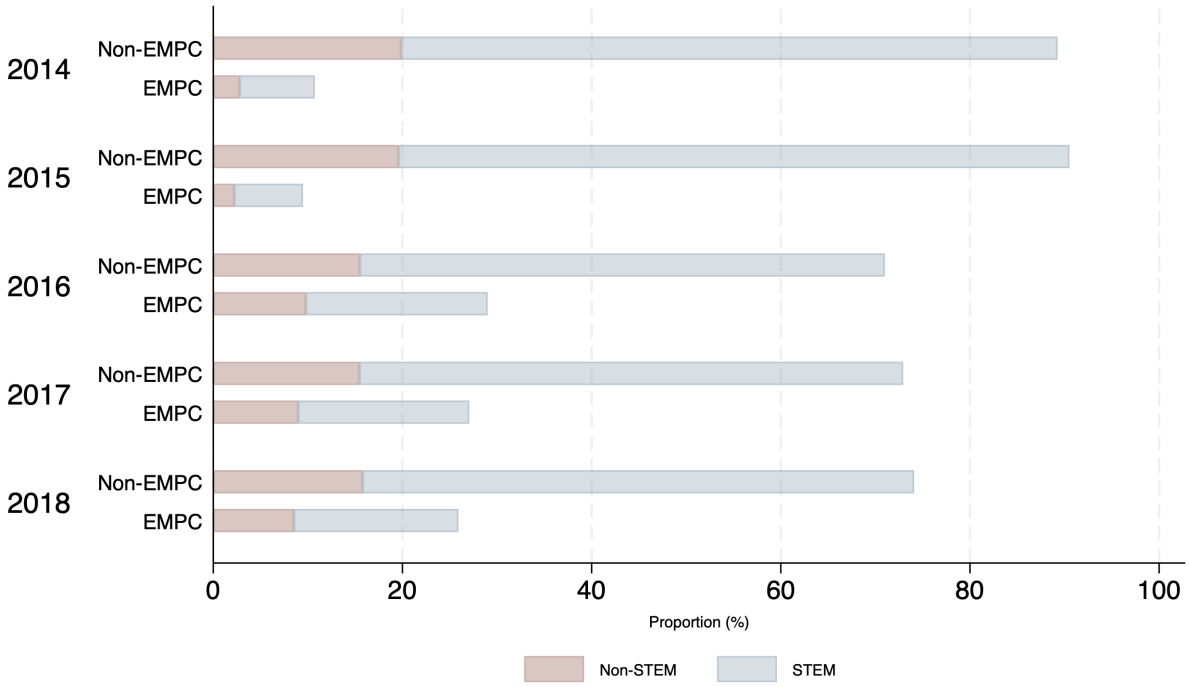
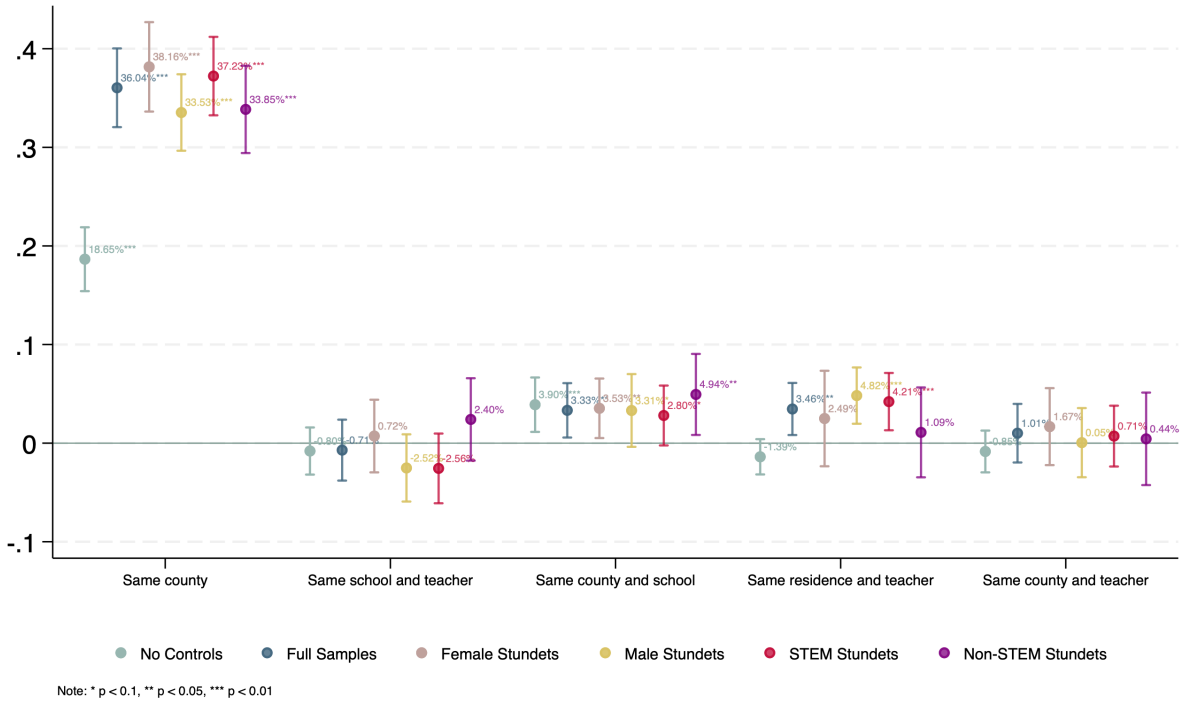
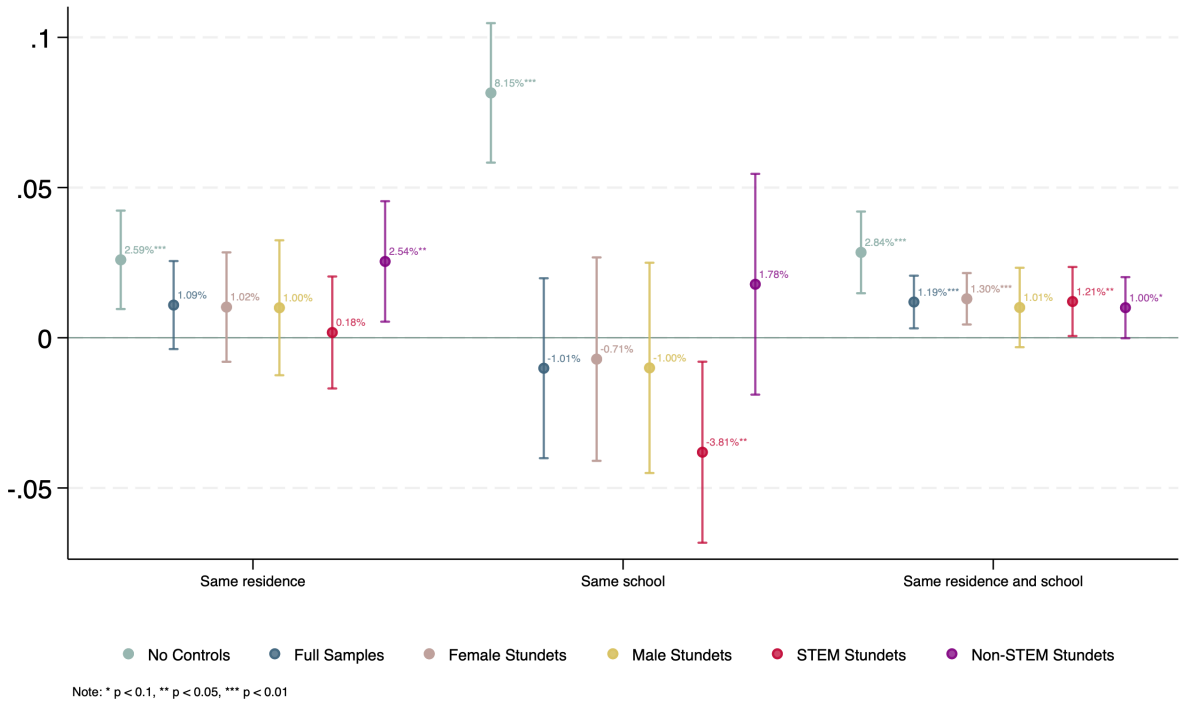


Figure 20: Robustness of DID Results: Previous-Year Peer Cohorts with Varying Group Definitions



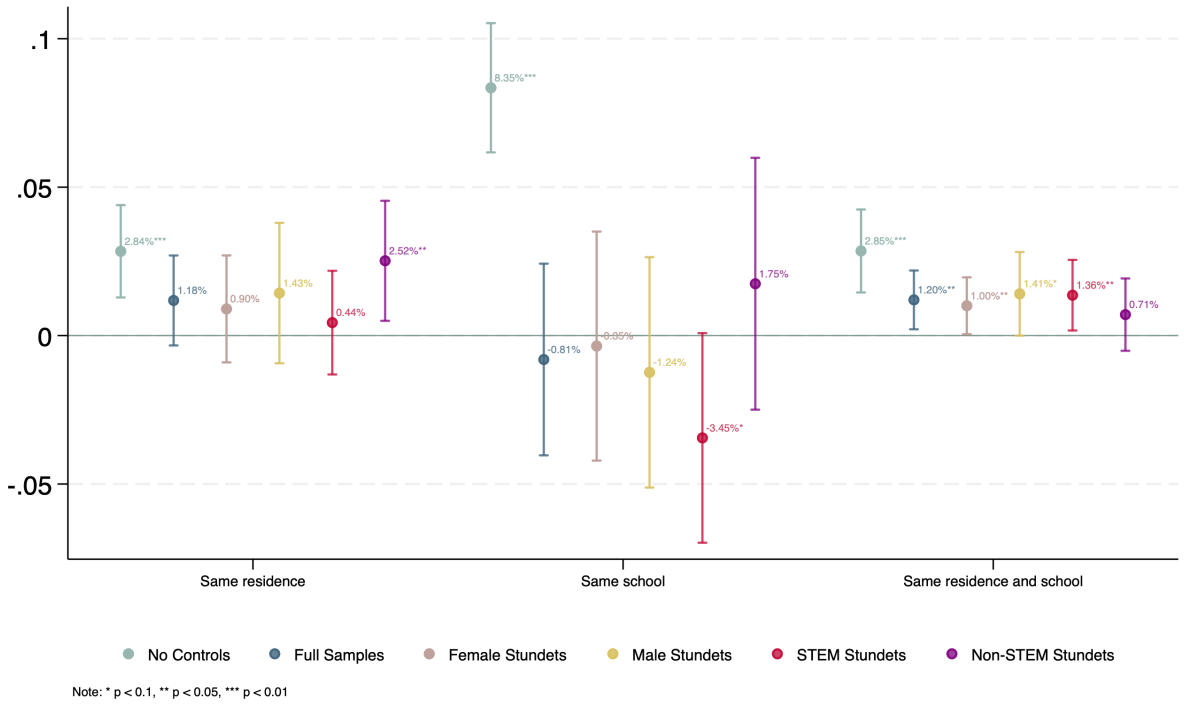
Note: * p < 0.1, ** p < 0.05, *** p < 0.01

Figure 21: Accumulated peer effects: Peers from the Cohort of the Previous Two Years



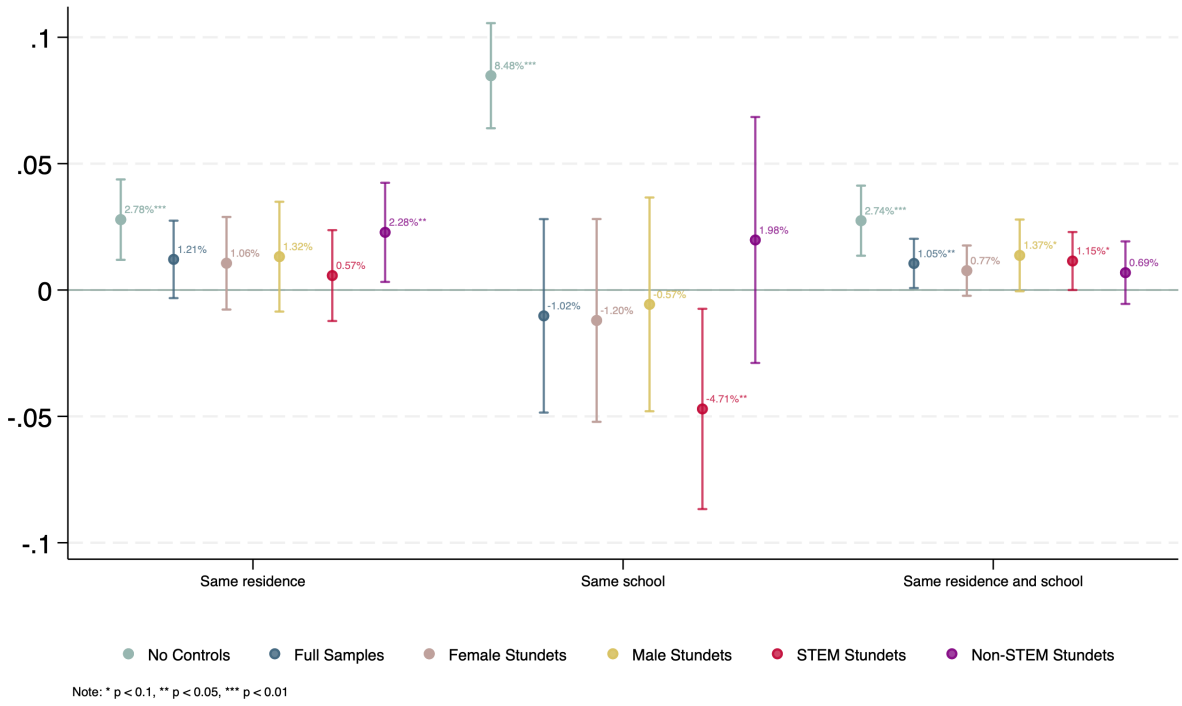
Note: * p < 0.1, ** p < 0.05, *** p < 0.01

Figure 22: Accumulated peer effects: Peers from the Cohort of the Previous Three Years



Note: * p < 0.1, ** p < 0.05, *** p < 0.01

Figure 23: Accumulated peer effects: Peers from the Cohort of the Previous Four Years



Note: * p < 0.1, ** p < 0.05, *** p < 0.01

8 Tables

Table 1: Summary Statistics: 2014-2018

	Han Majority					Ethnic Minority				
Variables	N	Mean	Sd	Min	Max	N	Mean	Sd	Min	Max
Duration of studies	160,272	3.619	0.546	1	9	75,719	3.286	0.966	1	8
NCEE row score	160,360	408.9	94.95	35	698	75,729	394.4	89.94	53	676
Adjusted NCEE scores	160,360	408.9	94.96	35	698	75,729	414.1	89.82	73	696
Bonus points	160,360	0.00399	0.217	0	20	75,729	19.71	1.674	0	20
Above cutoff scores	89,887	39.17	35.66	-429	246	42,058	9.929	37.47	-379	225
Score diff to minimum college admission	160,360	42.10	47.93	-16	488	75,729	29.64	57.49	-20	481
Retakeer(=1)	160,360	0.241	0.427	0	1	75,729	0.203	0.402	0	1
High school size	160,360	125,891	96,379	11	201,205	75,729	119,262	97,681	63	201,205
Female(=1)	160,360	0.534	0.499	0	1	75,729	0.553	0.497	0	1
Hui nationality(=1)	160,360	0	0	0	0	75,729	0.972	0.166	0	1
Rural(=1)	160,360	0.515	0.500	0	1	75,729	0.666	0.472	0	1
Poor county (=1)	160,360	0.364	0.481	0	1	75,729	0.551	0.497	0	1
Out of province(=1)	104,453	0.729	0.445	0	1	58,878	0.545	0.498	0	1
Near province(=1)	104,453	0.413	0.492	0	1	58,878	0.648	0.477	0	1
Age	160,360	19.09	1.110	13	37	75,729	19.34	1.380	12	38
STEM (=1)	160,360	0.669	0.471	0	1	75,729	0.643	0.479	0	1
Admitted to EMPC(=1)	160,360	0	0	0	0	75,729	0.113	0.316	0	1
Tier 1 college (=1)	160,360	0.209	0.407	0	1	75,729	0.227	0.419	0	1
Number of applications	160,360	4.275	3.427	1	47	75,729	6.401	5.041	1	51
Elite college (=1)	160,360	0.133	0.340	0	1	75,729	0.227	0.419	0	1
Gender of household head (Female=1)	159,709	0.139	0.346	0	1	75,263	0.113	0.317	0	1
Household head in agriculture (=1)	160,360	0.400	0.490	0	1	75,729	0.544	0.498	0	1
Household head in public sector (=1)	160,360	0.0861	0.281	0	1	75,729	0.0782	0.268	0	1

Table 2: Summary Statistics for Ethnic Minority Students: 2014-2018

	Not Admitted to EMPC					Admitted to EMPC				
Variables	N	Mean	Sd	Min	Max	N	Mean	Sd	Min	Max
Duration of studies	67,169	3.577	0.550	1	8	8,550	1.004	0.113	1	5
NCEE row score	67,179	389.6	92.77	53	676	8,550	431.5	49.70	197	598
Adjusted NCEE scores	67,179	409.3	92.64	73	696	8,550	451.2	49.74	217	618
Bonus points	67,179	19.72	1.659	0	20	8,550	19.67	1.789	10	20
Above cutoff scores	33,512	17.78	36.34	-379	225	8,546	-20.86	23.24	-97	133
Score diff to minimum college admission	67,179	32.76	56.40	-20	481	8,550	5.132	60.01	-20	440
Retakeer(=1)	67,179	0.198	0.399	0	1	8,550	0.242	0.428	0	1
High school size	67,179	118,215	97,877	63	201,205	8,550	127,487	95,734	237	201,205
Female(=1)	67,179	0.549	0.498	0	1	8,550	0.588	0.492	0	1
Hui nationality(=1)	67,179	0.972	0.164	0	1	8,550	0.967	0.179	0	1
Rural(=1)	67,179	0.671	0.470	0	1	8,550	0.627	0.484	0	1
Poor county (=1)	67,179	0.552	0.497	0	1	8,550	0.536	0.499	0	1
Out of province(=1)	50,900	0.550	0.497	0	1	7,978	0.510	0.500	0	1
Near province(=1)	50,900	0.643	0.479	0	1	7,978	0.684	0.465	0	1
Age	67,179	19.36	1.385	12	38	8,550	19.19	1.334	13	29
STEM (=1)	67,179	6.229	5.052	1	51	8,550	7.749	4.742	1	45
Tier 1 college (=1)	67,179	0.200	0.400	0	1	8,550	0.440	0.496	0	1
Number of applications	67,179	6.229	5.052	1	51	8,550	7.749	4.742	1	45
Elite college (=1)	67,179	0.214	0.410	0	1	8,550	0.329	0.470	0	1
Gender of household head (Female=1)	66,754	0.112	0.316	0	1	8,509	0.121	0.326	0	1
Household head in agriculture (=1)	67,179	0.551	0.497	0	1	8,550	0.491	0.500	0	1
Household head in public sector (=1)	67,179	0.0759	0.265	0	1	8,550	0.0958	0.294	0	1

Table 3: Distribution of Students Admitted to EMPC: 2014-2018

Year	EMPC	Other	Total
2014	1,718	45,669	47,387
2015	1,893	45,811	47,704
2016	1,756	47,160	48,916
2017	1,601	45,360	46,961
2018	1,582	43,539	45,121

Table 4: Peer Group Quantities and Maximum Student Numbers

Definitions of peer groups	# of peer groups	Maximum # of students
Same county	110	2,456
Same registered residence	1,083	497
Same school	415	1,397
Same school and teacher	10,382	211
Same registered residence and school	8,954	208
Same registered residence and teacher	43,557	41
Same county and teacher	21,700	206

Table 5: Cutoff Scores for STEM and Non-STEM Tracks by Tier in Ningxia: 2014-2018

Year	**Track**	**Tier 1**	**Tier 2**	**Tier 3**
2014	STEM	473	440	320
2014	Non-STEM	517	486	370
2015	STEM	445	416	316
2015	Non-STEM	507	478	378
2016	STEM	465	434	354
2016	Non-STEM	516	486	406
2017	STEM	439	408	328
2017	Non-STEM	519	487	407
2018	STEM	463	432	352
2018	Non-STEM	528	498	418

A Appendix

A.1 Tables

Table A.1: Enrollment Plan for Minority Preparatory Classes Program at Regular Higher Education Institutions in 2016

Year	Hebei	Shanxi	Neimenggu	Liaoning	Jilin	Heilongjiang	Jiangsu	Zhejiang	Anhui	Fujian	Jiangxi	Shandong	Henan	Hubei	Hunan	Guangdong	Guangxi	Hainan	Chongqing	Sichuan	Guizhou	Yunnan	Xizang	Shaanxi	Gansu	Qinghai	**Ningxia**	Xinjiang	Total
2016	816	49	3,533	719	1,028	1,205	4	103	191	504	152	73	2,385	2,197	2,034	48	5,105	439	1,314	2,273	6,176	4,065	855	234	2,399	1,695	**1,859**	8,355	49,810