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The effect of socioeconomic status on the student achievement gap in the United States:
Racial/ethnic disparities

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Abstract

This study investigates the effects of socioeconomic status on racial achievement gaps. The educational achievement gap is based on the study's standardized test scores and grade point averages. And for the empirical analysis, we used a trend analysis and regression approach based on two-way fixed and multilevel mixed-effects regression models. The trend analysis showed that the achievement gap between White and Black students is positive and substantially large, followed by White and Hispanic students. However, the differences in the achievement gap between white and Asian are negative, which shows that student achievement is much higher among Asian students than the White students. Furthermore, the estimated regression models showed that the achievement gap increased significantly as the socioeconomic status between white/black and white/Hispanic students increased. In contrast, the achievement gap significantly decreased as the socioeconomic status gap between white and Asian students changed.

Keywords: Education, inequality, racial achievement gap, Socioeconomic status, USA

1. Introduction

Achieving equity in education is vital to closing the educational achievement gap by race/ethnic groups in the United States (Darling-Hammond, 1998; Garcia and Weiss, 2017; Ladson-Billing, 2006; Orfield et al., 2003). Bradbury et al. (2015) argued that disparities in opportunity and outcomes along race and social class begin early and often persist throughout students' K-12 years and beyond since the racial achievement gap is vital in unequal educational outcomes. And they are much more prominent in the United States than in comparison to other countries, as noted by the authors. For instance, the achievement gaps in the United States exist between White, native English-speaking, middle to high-income students on the one hand and generally lower-income, culturally and linguistically diverse students on the other (Athanases and Martin 2006). Therefore, the disparity in educational outcomes between white and minority students or students in high and low-income districts has been linked to unequal access to crucial educational resources such as skilled teachers and quality of curriculum (Darling-Hammond 1998). For example, education is unequal in the United States because the wealthiest 10 percent of school districts spend nearly 10 times more than the poorest 10 percent in the country (Darling-Hammond 1998). The author noted further that two-thirds of minority students still attend schools that are predominantly minority located in central cities and funded well below those neighboring suburban districts. And the lack of resources in many schools serving low-income and minority students makes a difference in the educational outcomes of predominantly minority schools, which most students of color attend (Hung et al., 2020; Akiba et al., 2007).

According to Hung et al. (2020), achievement gaps have numerous explanations, including structural, societal, and economic elements. But education researchers and policymakers have paid particular attention to the underlying aspect of socioeconomic status (SES) in explaining the racial gap in student achievement (Garcia and Weiss, 2017; White et al., 1993; Hung et al., 2020; Zhang et al., 2015). For instance, Heyneman and Loxley (1983) argue that family SES is a more important predictor of the student achievement gap in developed countries. And, Tourangeau et al. (2013) defined SES as a composite index of a family's economic and social status relative to others, based on educational attainment and parents' occupation and household income. Moreover, as Duncan et al. (2011) and Garcia (2015) noted, SES is a measure of economic inequalities, considered one of the most significant drivers of education success. Robinson (2016) also revealed that ongoing socioeconomic and social stratification differences are at the root of the achievement gap. In

addition, Fryer and Levitt (2004) stated that strong racial evidence points to racial disparities in socioeconomic status as a primary contributor to the achievement gap.

In an attempt to define SES, Nicholson (2014) argue that receiving free and reduced-price lunch (FRPL) benefits can be used to proxy for SES. A lack of nutritious and adequate food could impact children's cognitive, emotional, and physical development in a food-insecure household (Alaimo et al., 2001). Also, a vast body of research has shown how the consequences of food insecurity and poor nutrition often result in poor academic performance and health among children (Whitaker et al., 2006; Diana et al., 2005). For example, if a child is hungry, their ability to concentrate, learn, thrive, and realize their full potential diminishes over time (Plaut et al., 2017). Accordingly, the analysis of the impact of food assistance programs such as free and reduced-price lunch programs (FRLP) on the academic performance of students in low- and middle-income households are well documented in the literature (Imberman and Kugler 2014; Schwartz and Rothbart 2017; Wang and Fawzi 2020; Gassman-Pines and Bellows 2018).

The recognition of household adult education attainment as a potential driver of the student achievement gap is the focus of the study by Hung et al. (2020). According to Carnevale et al. (2013), as parents earn more outstanding education, their children are less likely to live in poverty and have greater education levels as they age. In addition, Ladson-Billings (2006) argued for the need to look at household "education debt" that leads to achievement gaps among student groups. However, the disparities in achievement between white students and students of color have been linked to a substantial increase in parental investment in education among high-SES parents (Duncan and Murane, 2011). The differences in achievement gaps have also been linked to other indicators of SES, such as household unemployment and poverty levels (Ferguson et al., 2007; Austin, 2011). For instance, Ferguson et al. (2007) noted that poverty decreases a child's readiness for school through health, home life, schooling, and neighborhoods. Austin (2011) also indicated that 40 and 46 percent of the variation in average reading and math scores across states is associated with child poverty rates. The author argued further that a jobs program for black communities is integral to improving educational outcomes for black children.

Furthermore, Duncan and Murnane (2011) also stated striking differences in the academic achievement of students of color in urban settings and their suburban counterparts, suggesting that educational inequalities exist across districts, cities, and regions. Hence, to better understand

factors contributing to the disparities in education outcomes by race/ethnic groups, the study investigates the effects of socioeconomic status on the racial achievement gap in the United States. Specifically, the study aims to answer the following research question:

RQ: Does the differences in socioeconomic status (SES) play a role in the racial achievement gap in the United States?

Our purpose in answering this question is to contribute to conversations about the gaps in educational achievement by race/ethnic groups in the United States. In addition, we believe the research question will provide insights into educational inequities and inequalities in schools in the country. However, our empirical results show that the achievement gap between White and Black students is positive and substantially large, followed by White and Hispanic students. But the differences in the achievement gap between white and Asian are negative, which shows that student achievement is much higher among Asian students than the White students. Furthermore, the estimated regression models showed that the achievement gap increased significantly as the socioeconomic status between white/black and white/Hispanic students increased. In contrast, the achievement gap significantly decreased as the socioeconomic status gap between white and Asian students changed. These findings further underscore the stark racial divergence in the student achievement gap in the United States.

The rest of the study is structured as follows. Section 2 describes the data sources and description. Then, section 3 describes the estimation strategy, while section 4 focuses on the results and discussion. Finally, the concluding remarks are presented in section 5.

2. Data sources and description

The study employed the Stanford Education Data Archive (Reardon et al., 2021), which is publicly available (<https://edopportunity.org/get-the-data/seda-archive-downloads/#documentation-3>). We used version 4.1, which covers the 2008-2018 school year across 50 states and the District of Columbia from grades 3-8 and two different test subjects (maths and reading). A total of 5498 school districts were included in the data as the unit of analysis in the study. Hence, the data contains a single composite score for each local education (LEA) or district achievement score. However, the achievement score represents the average test score of students in a school district in the United States. Our analysis focuses on the achievement gap between white and minority.

The data also include information on the proportion of students in rural, town, and local suburban schools. Others include the proportion of students receiving free and reduced-price lunch benefits, percent of Black, Asian, and Hispanic students in the grade, and the percent of students in the state participating in English language learners (ELL) and special education programs. We also have data on the proportion of Black, Asian, and Hispanic adult households with at least a bachelor's degree, unemployed, headed by a single mother, and below the poverty line.

The data also include a composite standardized socioeconomic status (SES) measure. According to Tourangeau et al. (2013), composite SES measures a family's economic and social status relative to others based on educational attainment, parents' occupation, and household income. We employed the SES gap between white and minority households across the school district in the study. Hence, Table 1 presents summary statistics of variables used for the empirical analysis. Also, in Figures 2-4, we offer the histogram and kernel density distribution of the achievement gap between white and minority students. Except for Figure 3 represents the White/Asian student achievement gap that skewed to the left of the distribution, other Figures (2 and 4) represent White/Black and White/Hispanic student achievement gaps skewed to the right of the distribution.

3. Estimation Strategy

The study employed a regression approach to address the research question outlined in section 1 of this study. Accordingly, we regressed the socioeconomic status (SES) indicators and other control variables on the racial achievement gap. SES and other variables were taken as independent variables, with the achievement gap as the dependent variable. Hence, the estimated linear regression model employed is specified below:

$$Y_{ist} = \tau_0 + \emptyset SESGAP_{ist} + \gamma FRPL_{ist} + \beta Poverty_{its} + \sum_{j=1}^J \alpha_j X_{jist} + \varphi_s + \omega_t + \varepsilon_{ist} \quad 1$$

$$Y_{ist} = \tau_{0st} + \emptyset SESGAP_{ist} + \gamma FRPL_{ist} + \beta Poverty_{its} + \sum_{j=1}^J \alpha_j X_{jist} + \varepsilon_{ist} \quad 2$$

$$\tau_{0s} = \pi_{00} + \mu_{0s} \quad 3a$$

$$\tau_{1t} = \pi_{10} + \mu_{1t} \quad 3b$$

where $SESGAP_{ist}$ is the composite measure of the SES gap between white-minorities in school year t , school district i , and state s ; $FRPL_{ist}$ is an indicator of free and reduced-price lunch recipients; $Poverty_{its}$ is the poverty status; X_{jist} is a vector of other control variables considered, which includes the proportion of households with at least a bachelor's degree and headed by a single mom, the proportion of students that are the English language learner and in special education, the proportion of minorities in each grade, and proportion of students in rural, suburb, and town; $State$ and $Year$ represents the state and year fixed effect; $\tau_0, \phi, \gamma, \beta, \alpha_j, \vartheta_{01}$, and ϑ_{11} are parameters to be estimated; φ_i and ω_t represents state and year-fixed effects; ε_{ist} is the error term. The constant term π_{00} and π_{10} are the expected value of τ_0 , while μ_{0s} and μ_{1t} are the error term representing the remaining variability in the intercepts after controlling for $State$ and $Year$ random effect, respectively. Alternatively, μ_{0s} and μ_{1t} are cluster-specific random intercepts for state and school year, respectively.

For the estimation approach, we employed a two-way fixed-effect regression model for Equation 1 and a multilevel mixed-effects regression model for Equation 2. According to Theobald (2018), simple regression such as OLS is often not the best strategy when observations on students are not entirely independent but rather clustered in the district, school, year, zip code, or other factors. OLS biased the result. Therefore, we used the two-way fixed effect regression model to control unobserved heterogeneity across the states and school year that might biased results in the study. Also, it is most likely that students within a cluster (e.g., state or school year) share experiences not shared across the state or school years in the data (Ogundari, 2021). To this end, we used the state ID (equation 3a) and school year (equation 3b) as the random part and the independent variables as the fixed part in the multilevel mixed-effect regression model.

4. Results and Discussion

Before discussing the results, it is essential to present the correlation matrix of the variables used in the regression models. To this end, Tables A-C of the appendix show the correlation coefficients among the variables, which are less than 0.5 except few cases, thus suggesting that the multicollinearity problem is not severe for the estimated models. Hence, we do not believe that multicollinearity exerts an undue influence on the results presented in Tables 2-4.

4.1. The trend in achievement gaps between white and minority students over time

Figure 1 shows the trend in the mean achievement gap between white and minority students over time. The mean achievement gap between white and black students over the years reveals a light upward trend, while the mean achievement gap between white and Hispanic students is relatively stable. However, the trend in the achievement gap between white and Asian students shows a slight decline. Furthermore, the figure indicates that the white-black students' achievement gap is positive and larger, followed by the achievement gap between White-Hispanic students. Also, the achievement gap between White-Asian students shows a negative index, which suggests that achievement is much higher among Asian students than among White students. These results show widening performance gaps between White and Black/Hispanic students, thus reflecting educational inequality, which remains a problem in the American educational system.

And the widening achievement gap has been linked to inequity in education in the United States (Boschma and Brownstein, 2016; Hanushek and Rivkin, 2006; Goldhaber et al., 2015). This is because school resources such as finance, teacher, equipment, etc., are inequitably distributed across low and high-poverty school districts in the United States (Hanushek and Rivkin, 2006; Berne, 1994). According to Boschma and Brownstein (2016), the single most powerful predictor of racial gaps in educational achievement is the extent to which students attend schools surrounded by other low-income students. Hence, minority (i.e., Black and Hispanic) students do not receive the same learning experiences as their white counterparts because they are likelier to attend schools in less advantaged school districts (Goldhaber et al., 2015). Therefore, it is unexpected that white students in most high-income school districts will outperform minority students in most low-income districts (Boschma and Brownstein 2016). But Garcia (2020) also revealed that when black students can attend schools with lower concentrations of poverty and larger shares of white students, they perform better on average on standardized tests.

4.2. The effect of socioeconomic status on the student achievement gap

This section focuses on the effects of socioeconomic status (SES) on the racial achievement gaps in the United States. Hence, Tables 2, 3, and 4 present the effects of socioeconomic status and other control variables on the racial achievement gap in the study. Specifically, the coefficients of the SES gap between white and minority students (SES_WhiteBlack) and (SES_WhiteHispanic) are positive and significantly different from zero in Tables 2 and 4. This shows that as the SES gap

between White and Black/Hispanic students increased, the disparity in academic achievement increased significantly. The implication is that socioeconomic disadvantage is significant in the racial achievement gaps in the United States. The finding is unsurprising because it is unrealistic to expect to close the white/Black and White/Hispanic achievement gap. In contrast, the SES gaps between blacks/white and Hispanic/whites are large, as shown in Table 1 (i.e., SES_WhiteBlack and SES_Hispanic are both positive). Most African American and Hispanic students participate in public schools where most of their classmates qualify as poor or low-income (Boschma and Brownstein 2016). Also, Garcia (2020) argues that black children are more than twice as likely as white children to attend high-poverty schools.

In contrast, the estimated coefficient of the SES gap between White and Asian students (SES_WhiteAsian) in Table 3 is negative and significantly different from zero. The implication is that the SES gap significantly decreased the achievement gap between white and Asian students. Also, the declining achievement gaps between Asian and White students are not surprising given that the SES gaps are negative in Table 1 (i.e., SES_WhiteAsian is negative).

The effects of other measures of SES, such as poverty status, employment status, and educational level of households, adults, and recipients of free and reduced-price lunch (FRPL) on racial achievement gaps, provide mixed results. For example, we find that achievement gaps between white and black students decreased significantly in districts with high households below the poverty line and the unemployed black in Table 2. In contrast, Table 3 shows that achievement gaps between White and Asian students increased significantly in districts with high levels of households below the poverty line and the unemployed Asian family. However, there is no significant association between poverty and achievement gaps between white and Hispanic students, as shown in Table 4. Still, the result shows that the achievement gaps between white and Hispanic students decreased significantly in districts with high levels of unemployed Asians in Table 4. In addition, we find no evidence that the education of black households affects the achievement gap between white and black students in the study, as shown in Table 2. This result contradicts the finding of Hung et al. (2020). The authors found that adult educational attainment is significantly and positively associated with achievement gaps between white and black students in the United States. But the achievement gap between white and Asian students decreased in districts with high levels of Asian households with at least a bachelor's degree, as shown in Table

3. In contrast, the achievement gap between white and Hispanic students increased in districts with high levels of Hispanic households with at least a bachelor's degree in Table 4. Finally, we do not find a significant effect of free and reduced-price lunch (FRPL) on racial achievement gaps across the models except for the multilevel mixed effect model in Table 4 in the study.

These findings show that racial differences in SES are a primary contributor to racial achievement gaps in the study, which is consistent with the works of Fryer and Levitt (2004), Dahl and Lochner (2005), and Lee and Burkam (2002). Dahl and Lochner (2005) and Lee and Burkam (2002) reveal that children from low SES backgrounds demonstrate lower literacy scores and math competencies, leading to under-preparation and widening the achievement gap. The results of other determinants show that efforts to promote policies that reduce poverty and increase low-income families' economic security are central to addressing inequalities of achievement across race/ethnic groups in the United States.

4.3. The effects of other control variables

The disparity in the rate at which black, Hispanic, and white students go to school with poor classmates is the best predictor of the racial achievement gap (Garcia 2020; Boschma and Brownstein 2016). To this end, we examine the relationship between the percentage of minority students in the grade and achievement gaps in the study. The coefficient of Black_grade is negative and significantly different from zero, as shown in Table 2. This indicates that the achievement gap decreases as the proportion of black students in each grade increases. The implication is that increased enrollment of African American students in the school districts reduced achievement gaps between white and black students. On the other hand, there is no significant relationship between Asian and Hispanic populations in the grade on respective achievement gaps in Tables 3 and 4.

Furthermore, the divergence in academic achievement between white/black students and white/Hispanic students decreased significantly in districts with high levels of households headed by a single mum, as shown in Tables 2 and 4. Also, the disparity in academic achievement between white and black students increased significantly in districts with high English Language Learners (ELL) and special education students (SPECED), as shown in Table 2. In contrast, the achievement gap between white and Asian students decreased significantly in districts with high English Language Learners (ELL) and special education students (PECED), as shown in Table 3. Finally,

the achievement gap between white and Hispanic students increased significantly in districts with high English Language Learners (ELL). However, it decreases in districts with high special education students (SPECED), as shown in Table 4.

Further analysis shows that the achievement gap between white/black and white/Hispanic students decreased significantly in local rural, town, and suburban schools, as shown in Tables 2 and 4. However, the variation in the achievement gap between white and Asian students is insignificantly different from zero among the students in local rural and suburban schools, as shown in Table 3. Thus, although it decreases significantly among students in rural schools based on the multilevel, there is no evidence of such in the fixed-effect model. These findings showed that racial divergence in student achievement varies widely by rural, suburban, and town school districts.

5. Concluding remarks

Educational researchers and practitioners have long been concerned with identifying policy instruments to reduce the racial achievement gap in the United States. We analyzed the trends in achievement gaps between white and minority students over time in recognition of this. We also investigate the effects of socioeconomic status (SES) on the achievement gap. The trend analysis shows that the change in the mean achievement gap over time between white and Black/Hispanic students is positive and substantially higher among white and black students than among white and Hispanic students. In contrast, the mean achievement gap between white and Asian students is negative, meaning that achievement gaps are much higher among Asian students than White students in the United States. Furthermore, the estimated regression models showed that the achievement gap increased significantly as the SES gap between white/black and white/Hispanic students increased. In contrast, the achievement gap significantly decreased as the SES gap between white and Asian students changed. Other results also showed that adult educational attainment does not affect achievement gaps between white/black students. Yet, at the same time, it is a significant driver of achievement gaps between white and Asian/Hispanic students. The finding also showed that racial divergence in student achievement varies widely by school districts in rural, suburbs, and towns.

Our findings underscore the stark racial divergence in student achievement driven by the SES gap in the United States. Specifically, the present study broadly supports a strengthening association between students' academic achievement and family SES. However, we believe one of

the drivers of the SES achievement gap is the underlining educational inequity in the United States. This is because school resources such as finance, teacher, equipment, etc., are inequitably distributed across low and high-poverty school districts, while minority students are likely to attend schools located in less advantaged school districts in the United States (Hanushek and Rivkin, 2006; Berne, 1994; Goldhaber et al., 2015). This shows that inequity in education creates unequal treatment for students across low and high-poverty school districts, increasing the racial achievement gap. To this end, we believe efforts to promote policies that facilitate a shift away from the current pattern of heavily segregated schools would thus help close the gap between minority and white students in the United States. And failure to embrace policies essential to decrease the racial achievement gaps could undermine efforts to improve educational outcomes in the country.

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Table 1: Summary statistics of the variables

Variables	Description	Obs.	Mean	Std. Dev.
AchievementGAP_ WhiteBlack	White-Black AchievementGAP	5228	2.3617	0.6912
AchievementGAP_ WhiteAsian	White-Asian AchievementGAP	5261	-0.7069	1.0088
AchievementGAP_ WhiteHispanic	White-Hispanic AchievementGAP	5270	1.7769	0.6886
SES_ WhiteBlack	White-Black Socioeconomic status (SES) difference	5438	2.3487	0.7552
SES_ WhiteAsian	White-Asian Socioeconomic status (SES) difference	5438	-0.2359	0.4667
SES_ WhiteHispanic	White-Hispanic Socioeconomic status (SES) difference	5498	1.4325	0.5924
Unemployed_ Black	Proportion unemployed (Black)	5498	0.1525	0.1467
Unemployed_ Asian	Proportion unemployed (Asian)	5498	0.0456	0.0815
Unemployed_ Hispanic	Proportion unemployed (Hispanic)	5498	0.1761	0.1614
Poverty_ Black	Households below the poverty line (Black)	5438	0.2518	0.0681
Poverty_ Asian	Households below the poverty line (Asian)	5438	0.1301	0.0415
Poverty_ Hispanic	Households below the poverty line (Hispanic)	5498	0.2269	0.0592
Education_ Black	Households having bachelor's degrees and above (Black)	5438	0.2117	0.0538
Education_ Asian	Households having bachelor's degrees and above (Asian)	5438	0.5057	0.1183
Education_ Hispanic	Households having bachelor's degrees and above (Hispanic)	5498	0.1768	0.0657
Singlemom_ Black	The proportion of households headed by a single mother (Black)	5438	0.4123	0.1021
Singlemom_ Asian	The proportion of households headed by a single mother (Asian)	5438	0.1191	0.0436
Singlemom_ Hispanic	The proportion of households headed by a single mother (Hispanic)	5498	0.2473	0.0580
Black_grade	Percent of Black in the grade	5498	0.1525	0.1467
Asian_grade	Percent of Asians in the grade	5498	0.0456	0.0815
Hispanic_grade	Percent of Hispanics in the grade	5498	0.1761	0.1614
FRPL	Percent of students participated in free and reduced-price lunch	5498	0.4989	0.1182
ELL	Percent of students participated in the English language learner	5498	0.0654	0.0413
SPECED	Percent of students who participated in special education	5498	0.1393	0.0319
Rural	The proportion of students in local rural schools	5498	0.2589	0.1315
Suburb	The proportion of students in suburb local schools	5498	0.3159	0.1897
Town	The proportion of students in the town's local schools	5498	0.1574	0.0909

Table 2: White-Black Achievement Gap

Explanatory Variables	Fixed Effect Model		Multilevel Mixed Effect Model	
	Coefficient	Std. Error	Coefficient	Std. Error
SES_WhiteBlack	0.0757**	0.0350	0.0814***	0.0333
Unemployed_Black	-1.6328***	0.2291	-1.5589***	0.2091
Poverty_Black	-0.5343**	0.2416	-0.6131***	0.2315
Education_Black	0.2249	0.1665	0.2763	0.1572
Singlemom_Black	-0.4758***	0.1526	-0.4297***	0.1473
Black_grade	-2.9881***	0.5006	-0.6131***	0.2315
FRPL	-0.1394	0.1154	-0.1326	0.1094
ELL	0.9974***	0.3467	1.7022***	0.3351
SPECED	0.9760***	0.3602	0.8137***	0.3428
Rural	-0.6985*	0.3819	-1.2200***	0.3232
Suburb	-0.8205**	0.4135	-1.2356***	0.3427
Town	-1.1394***	0.6177	-2.3757***	0.5144
State fixed effect	YES			
Year fixed effect	YES			
Constant	4.0030***	0.3377	3.7557***	0.2746
Prob > F / chi2ixed	0.0000		0.0000	
Adj. R-Squared	0.8072			
Random Effects				
State [var(_cons)]			0.3925	0.1090
Year [var(_cons)]			0.0259	0.0024

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Table 3: White-Asian Achievement Gap

Explanatory Variables	Fixed Effect Model		Multilevel Mixed Effect Model	
	Coefficient	Std. Error	Coefficient	Std. Error
SES_WhiteAsian	-0.3146***	0.0557	-0.2962***	0.0509
Unemployed_Asian	4.8663***	0.5986	5.2422***	0.5265
Poverty_Asian	0.6513**	0.3180	0.5798**	0.2937
Education_Asian	-0.8019***	0.1309	-0.7763***	0.1181
Singlemom_Asian	0.9478***	0.2523	0.6725***	0.2352
Asian_grade	-0.5244	0.6046	0.2262	0.5309
FRPL	0.0215	0.1882	0.0078	0.1739
ELL	-2.1416***	0.5483	-1.9114***	0.5161
SPECED	-2.3651***	0.5694	-3.0667***	0.5283
Rural	0.4607	0.5982	-0.4076	0.4888
Suburb	-0.3435	0.6532	-1.1590**	0.5178
Town	1.8411	1.0129	0.7893	0.7967
State fixed effect	YES			
Year fixed effect	YES			
Constant	-1.7126***	0.4799	0.1063	0.3953
Prob > F / chi2	0.0000		0.0000	
Adj. R-Squared	0.7735			
Random Effects				
State [var(_cons)]			0.7892	0.1688
Year [var(_cons)]			0.0462	0.0044

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Table 4: White-Hispanic Achievement Gap

Explanatory Variables	Fixed Effect Model		Multilevel Mixed Effect Model	
	Coefficient	Std. Error	Coefficient	Std. Error
SES_WhiteHispanic	0.0819**	0.0420	0.1019**	0.0417
Unemployed_Hispanic	-1.2653***	0.3171	-1.0878***	0.2961
Poverty_Hispanic	-0.0443	0.2484	0.0318	0.2438
Education_Hispanic	0.6124***	0.2158	0.8069***	0.2099
Singlemom_Hispanic	-0.7992***	0.2129	-0.8451***	0.2111
Hispanic_grade	-0.0952	0.2847	-0.1250	0.2559
FRPL	-0.1841	0.1208	-0.2418**	0.1178
ELL	1.6589***	0.3353	1.8370***	0.3315
SPECED	-1.0623***	0.3444	-1.2304***	0.3357
Rural	-0.3496	0.3799	-0.8941***	0.3213
Suburb	-0.7782**	0.4035	-1.0701***	0.3239
Town	-0.7562	0.6339	-2.0483***	0.5103
State fixed effect	YES			
Year fixed effect	YES			
Constant	2.4206***	0.3158	2.8530***	0.2768
Prob > F / chi2	0.0000		0.0000	
Adj. R-Squared	0.8147			
Random Effects				
State [var(_cons)]			0.2413	0.0552
Year [var(_cons)]			0.0072	0.0011

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

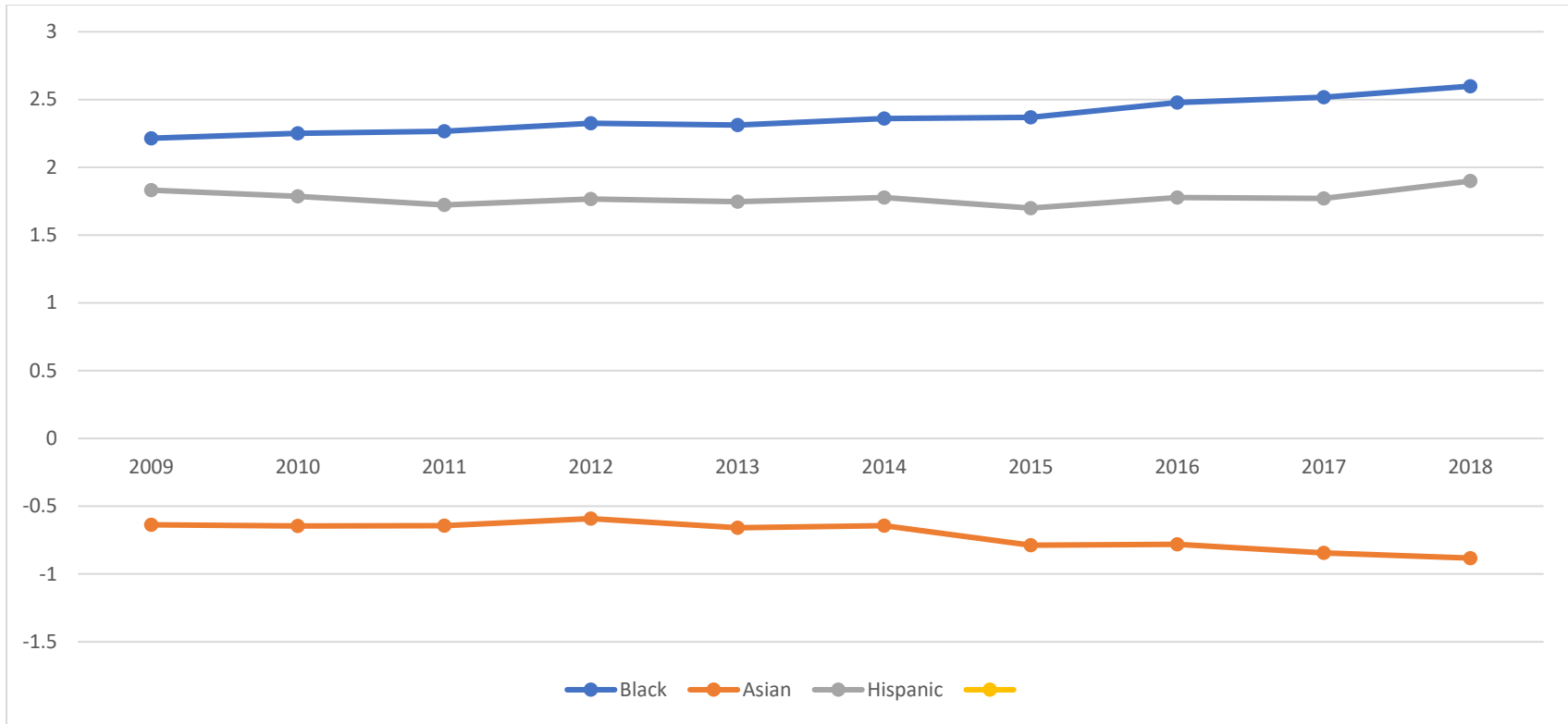


Figure1: Trend in the mean achievement gap between white and minorities students over time

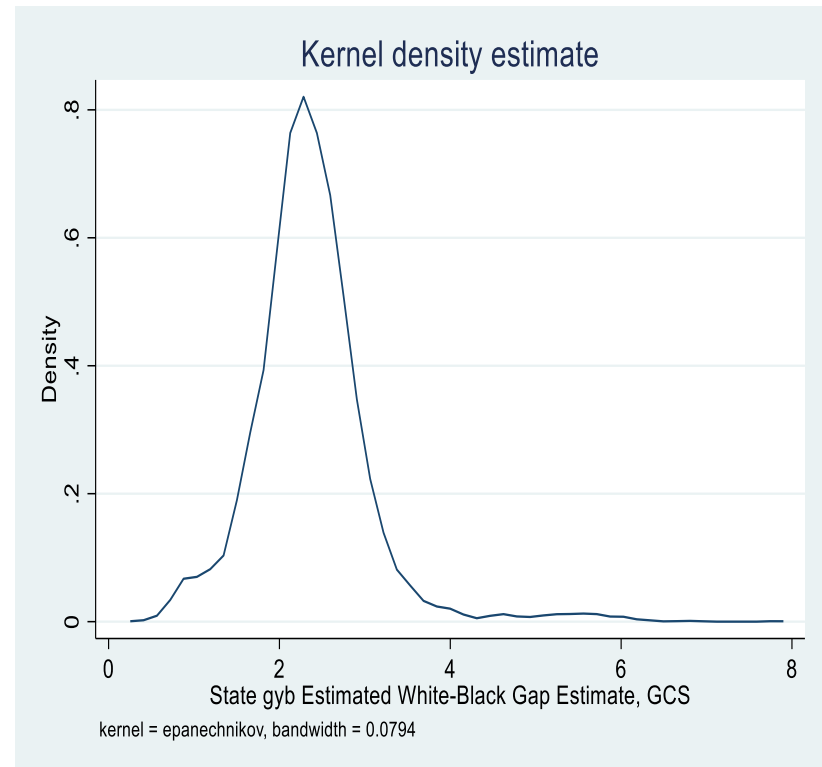
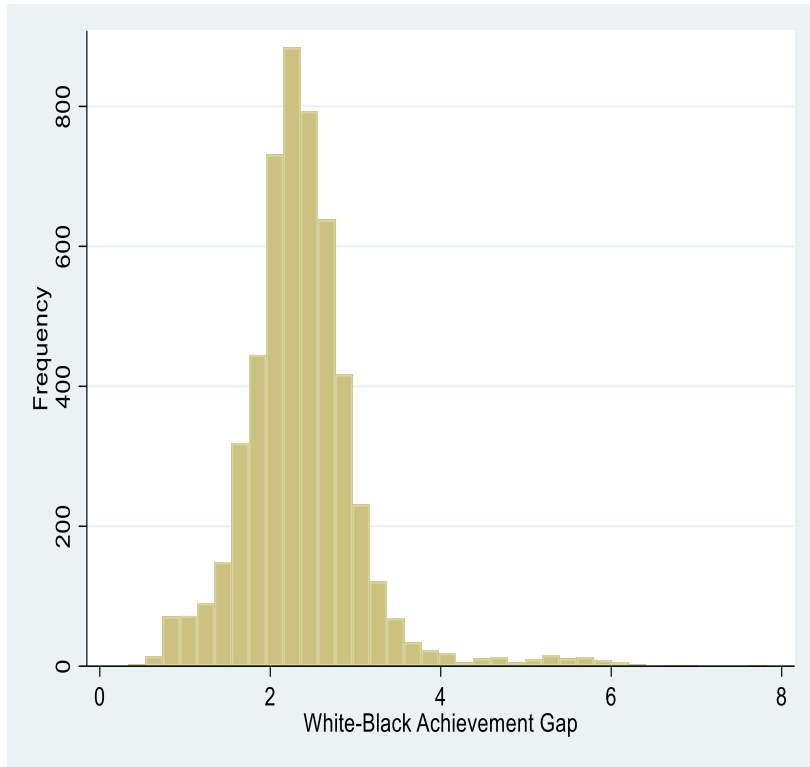


Figure 2: Distribution of achievement gap between white and black students

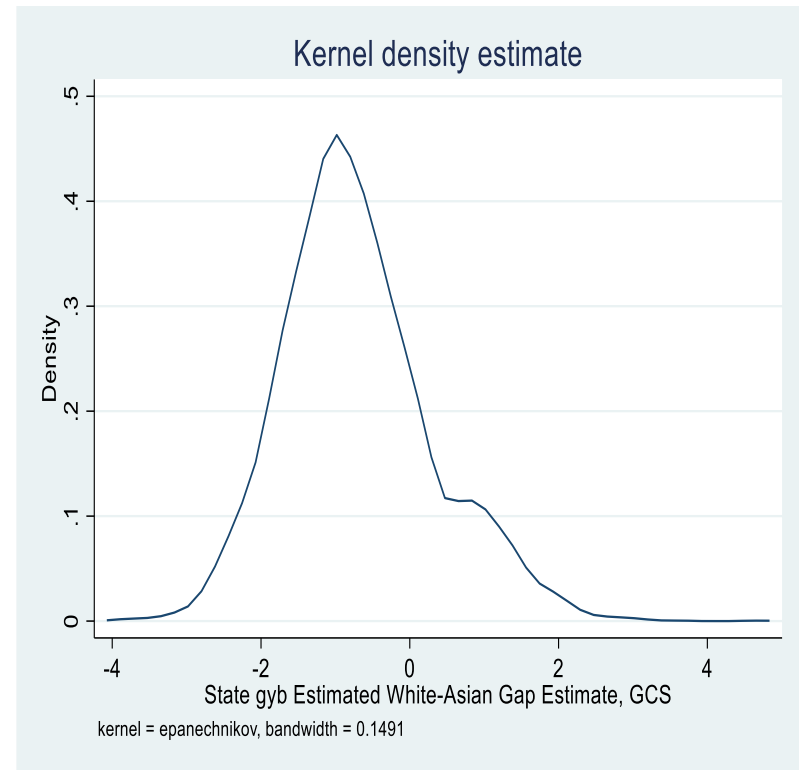
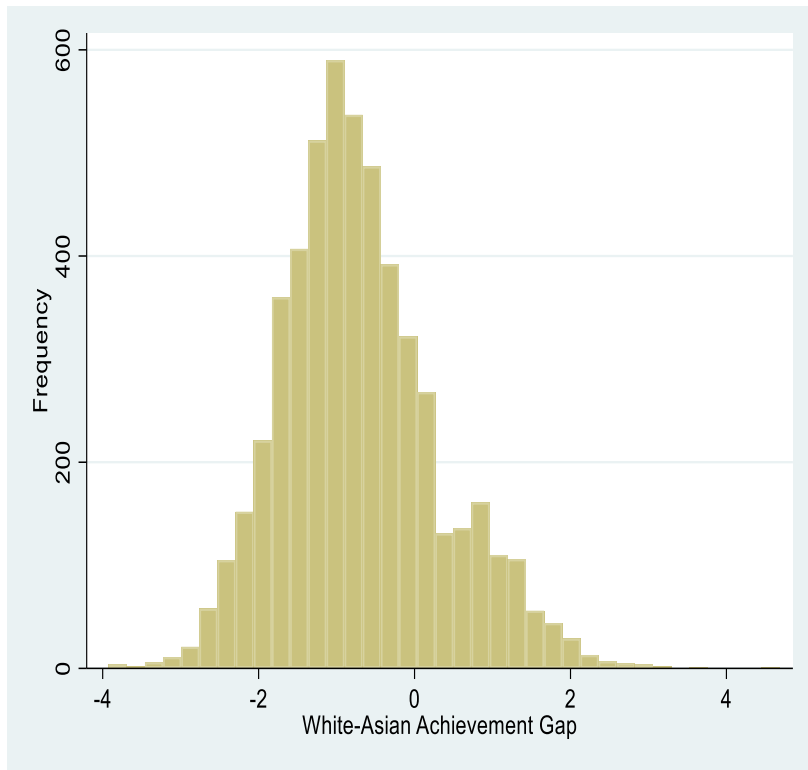


Figure 3: Distribution of achievement gap between White and Asian students

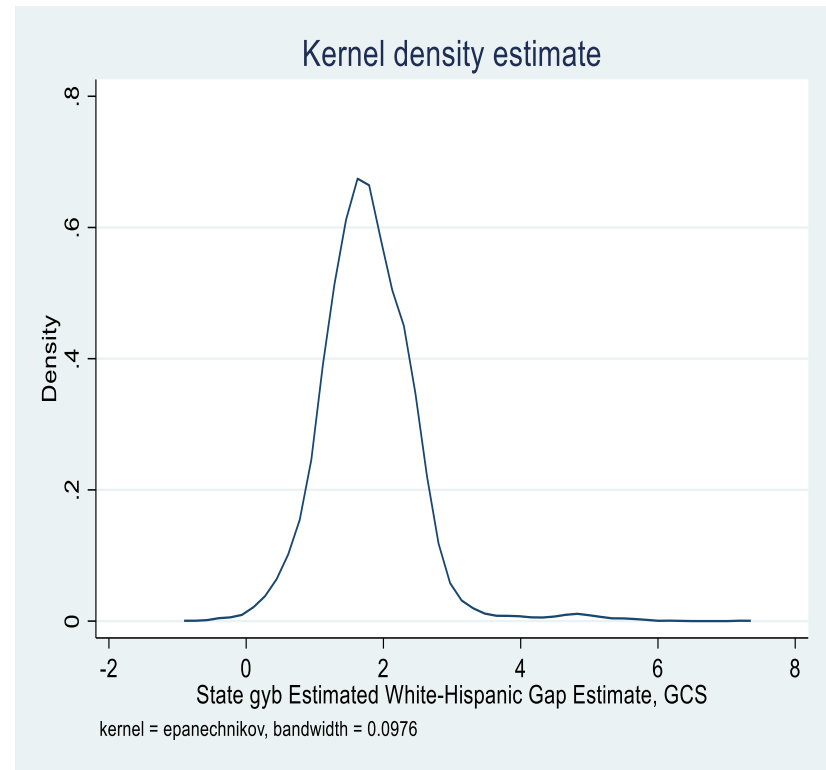
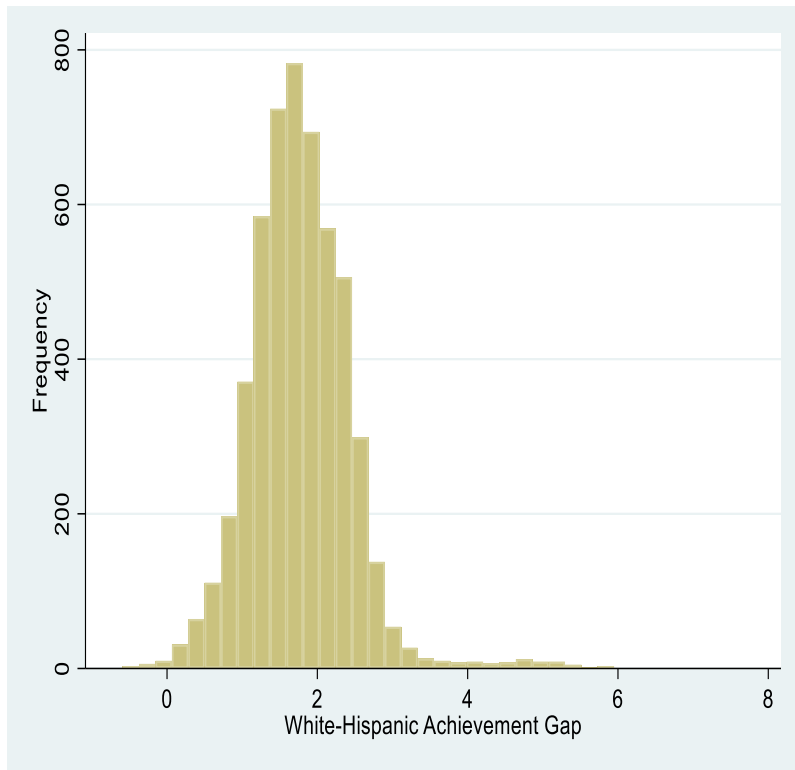


Figure 4: Distribution of achievement gap between White and Hispanic students

Appendix

Table A: Variables used for explaining the White-Black Achievement Gap

	SES	Unemployed	Poverty	Education	Single mom	Black	FRPL	ELL	SPECED	Rural	Suburb	Town
SES	1.0000											
Unemployed	0.4494	1.0000										
Poverty	0.3831	0.5226	1.0000									
Education	-0.4517	-0.2231	-0.4737	1.0000								
Single mom	0.7578	0.3166	0.4085	-0.4677	1.0000							
Hispanic	0.4277	0.1726	0.0984	-0.1920	0.5031	1.0000						
FRPL	0.1111	0.0839	0.1350	-0.1863	0.1938	0.5517	1.0000					
ELL	-0.0899	-0.0993	-0.2912	0.1755	-0.0972	-0.0821	0.2302	1.0000				
SPECED	0.1243	-0.0888	0.0137	-0.1301	0.1993	-0.0354	-0.1106	-0.2224	1.0000			
Rural	-0.1083	-0.0225	0.3519	-0.1871	-0.0703	-0.0829	-0.0462	-0.5670	-0.0035	1.0000		
Suburb	-0.0298	-0.0466	-0.3105	0.1029	0.1051	0.0187	-0.2248	0.2130	0.1043	-0.5470	1.0000	
Town	-0.2678	-0.0688	0.1918	-0.0434	-0.3661	-0.3613	-0.0460	-0.3087	-0.0514	0.5177	-0.5177	1.0000

Table B: Variables used for explaining the White-Asian Achievement Gap

	SES	Unemployed	Poverty	Education	Single mom	Asian	FRPL	ELL	SPECED	Rural	Suburb	Town
SES	1.0000											
Unemployed	0.1863	1.0000										
Poverty	0.2769	0.1527	1.0000									
Education	-0.3647	-0.2421	-0.0463	1.0000								
Single mom	0.5017	0.1018	0.1208	-0.3819	1.0000							
Hispanic	0.1269	-0.0819	-0.3280	-0.1888	0.2029	1.0000						
FRPL	-0.2111	-0.1221	0.0197	0.0876	0.0290	-0.0653	1.0000					
ELL	0.1249	-0.0328	-0.2667	0.0076	0.1332	0.2359	0.2302	1.0000				
SPECED	-0.0440	-0.0691	0.1373	0.2474	-0.0835	-0.1396	-0.1106	-0.2224	1.0000			
Rural	-0.0821	0.0733	0.2713	-0.2842	0.0567	-0.3389	-0.0462	-0.2570	-0.0035	1.0000		
Suburb	-0.2230	-0.0228	-0.3649	0.2656	-0.1789	0.2668	-0.2248	0.2130	0.1043	-0.5470	1.0000	
Town	0.0971	0.0734	0.3144	-0.3835	0.1305	-0.0469	-0.0460	-0.3087	-0.0514	0.5177	-0.5177	1.0000

Table C: Variables used for explaining the White-Hispanic Achievement Gap

	SES	Unemployed	Poverty	Education	Single mom	Hispanic	FRPL	ELL	SPECED	Rural	Suburb	Town
SES	1.0000											
Unemployed	0.3106	1.0000										
Poverty	0.3630	0.4996	1.0000									
Education	-0.1636	-0.1329	-0.3055	1.0000								
Single mom	0.4178	0.3942	0.2857	-0.0633	1.0000							
Hispanic	0.2136	0.2030	0.1131	-0.1843	0.2246	1.0000						
FRPL	-0.1556	0.0250	0.2728	0.0671	-0.1825	0.4049	1.0000					
ELL	0.1401	-0.0636	-0.2963	-0.2187	0.0215	0.4980	0.1545	1.0000				
SPECED	0.1488	0.1466	0.2197	0.2107	0.3258	0.1012	0.0851	-0.2667	1.0000			
Rural	-0.4517	-0.1275	0.2083	0.0782	-0.4063	-0.3740	-0.0916	-0.3028	-0.0720	1.0000		
Suburb	0.3640	0.1829	0.0136	-0.1782	0.4135	0.3250	-0.1390	0.1775	0.1782	-0.5548	1.0000	
Town	-0.4495	-0.1840	-0.0478	-0.1534	-0.3994	-0.3518	-0.0917	-0.2805	-0.1096	0.5242	-0.5239	1.0000