Narrow paths out of poverty and educational demand: Evidence from Dominican baseball*

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Abstract

Do narrow, or improbable, paths out of poverty, such asthose in sports and entertainment, reduce the demand for schooling? We studythe effect of professional baseball on educational attainment in the DominicanRepublic, where all Major League Baseball (MLB) teams recruit teenageboys. We exploit plausibly exogenous variation in exposure to MLB's sudden entry into the Dominican Republic based on birthplace—reflecting preexisting local baseball cultures—and gender, since girls are not recruited for baseball. We find that baseball has no measurable effect on school attendance, in contrast to popular perception.

Keywords: human capital, returns to education, labor markets and school enrollment, economic development

JEL Classification Numbers: J24, I25, O15

1 Introduction

Educational investments are shaped by the returns to schooling (Adukia et al., 2020; Heath & Mobarak, 2015; Jensen, 2012; Kuka et al., 2020; Oster & Steinberg, 2013). The demand for education falls as the wages of workers with low levels of education rise relative to wages of workers with high levels of education (Atkin, 2016; Black et al., 2005; Cascio & Narayan, 2022; Moeeni & Tanaka, 2023; Shah & Steinberg, 2017, 2021), and vice versa (Abarcar & Theoharides, 2021), although human capital accumulation in the long run may be unaffected (Emery et al., 2012). The demand for education may also be low if students or their families underestimate the returns to education, as occurs in developing countries (Jensen, 2010).

Some careers, especially in sports and entertainment, offer extremely high upside (i.e., fame and fortune) with little chance of success. For example, more than 250 million people worldwide play soccer, but only around 130 thousand do so professionally (Fédération Internationale de Football Association, 2019).[1] Do such opportunities, which exert an outsized cultural influence and are thus highly visible, affect educational decisions? That is, do the slim possibilities of riches erode the perceived returns to education and reduce the demand for schooling, especially in low-income or developing contexts where youths feel desperate to escape from poverty?

In this paper, we explore the effect of professional baseball teams recruiting teenage boys on educational attainment in the Dominican Republic. All 30 Major League Baseball (MLB) franchises and one Japanese team operate training facilities there. In the 2022 season, 11.5% of MLB players were born in the Dominican Republic, a country with a population of just 11 million (Baseball Almanac, 2022). Estimates of those training full time for professional baseball vary from more than 21,000 (Dominican Republic Ministry of Education, 2018) to 100,000 (Finkel et al., 2012), or about 3 to 15% of teenage boys. The supposed negative

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[1]Sports is not the only profession fitting this profile. In the United States, 1 in 4 members of Gen Z plan to become social media influencers (Langdon, 2022).

effect of baseball on boys' educational attainment in the Dominican Republic has been widely covered in the popular press (VICE Sports, 2015; Zirin, 2005), legal journals (Gentile, 2022; Hanlon, 2013; Kalthoff, 2013; Nieves Murphy, 2023; Ottenson, 2014; Spagnuolo, 2003; White, 2017; Williamson, 2013), and think tank articles (Council on Hemispheric Affairs, 2010; Lisman, 2019). It is the focus of an active policy discussion involving the US Agency for International Development (USAID), the Dominican Ministry of Education, MLB, and the MLB Players Association. Yet the causal evidence supporting it is limited. One study, Chon (2020), found a null effect of baseball on education, but the scope was limited to the effects of a visa expansion in 2006. No one has examined the effects of the entry of MLB recruiting in the 1970s and its work over subsequent decades on education.

We estimate the effect of baseball recruitment on the educational attainment of teenage boys in an event study, exposure research design. We exploit the entry of MLB into the Dominican Republic following changes in its recruitment rules for domestic players and variation in preexisting local baseball cultures. Although baseball had been popular in the Dominican Republic since the early 20th century, the MLB did not extensively recruit there until the late 1970s after new MLB rules (the draft and minimum ages) reduced the benefits of signing and developing players from the United States (Bailey & Shepherd, 2011). The timing of MLB's entry into the Dominican Republic is, therefore, exogenous to Dominican boys' training and educational choices. But the recruiting shock did not affect all Dominican provinces equally. We follow the literature and hypothesize that the effect of MLB's entry on educational attainment should be more pronounced in provinces that already produced professional baseball players (Abarcar & Theoharides, 2021; Khanna & Morales, 2017). This differential effect comes from local cultural factors that promote baseball and from American recruiters naturally looking in places that had already produced professional players. Our measure of a province's policy exposure, therefore, is the number of active professional baseball players from the province in 1977. This measure strongly predicts the number of professional players that province produced from 1977 to 2010.

We use the event study and exposure design to test whether the MLB's entry caused a decrease in male educational outcomes. Using the 2010 Dominican census, in an analysis of only male birth cohorts, we find precise null effects for primary school completion, secondary school completion, and years of schooling completed. To address concerns about differential educational trends across provinces, we take advantage of the policy only changing the returns to education for males. When we include female birth cohorts in the regressions, we find no evidence for harmful effects to education. Since using just the 2010 census might bias our results through attrition or recall error, we check the robustness of our results to looking across multiple censuses at the share of kids enrolled in school that year. We still find null results. The null results are are robust to excluding an outlier and employing an alternative exposure variable. In other words, we make strenuous efforts in search of an effect and repeatedly find nothing.

This paper contributes to the literature on the relationship between the returns to schooling and educational attainment by examining a situation where, despite expectations, youths do not systematically forgo education in favor of low-probability paths out of poverty. Past work confirms theoretical predictions that the demand for education falls as the returns to education fall, but the outside employment opportunities considered in those papers are not high risk in the sense that they do not require years of up-front investment with small chances of success, unlike baseball (Adukia et al., 2020; Atkin, 2016; Black et al., 2005; Cascio & Narayan, 2022; Heath & Mobarak, 2015; Oster & Steinberg, 2013; Shah & Steinberg, 2017, 2021). In the United States, scholars have expressed concern that Black youths may see sports, rather than education, as a primary means of economic advancement (Beamon & Bell, 2006; Edwards, 2000; Gates, 1991). Black and Hispanic parents prioritize the pursuit of professional playing opportunities as an outcome for youth sports at much higher rates than do white parents (Solomon, 2020). Around the world, the option to play professional soccer in Europe may have pushed men out of college (Rossi & Ruzzier, 2018). Our study suggests that unsatisfactory educational outcomes are caused by factors other than sports. Other

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studies find some evidence of a positive effect of athletics on education, but the mechanisms are skills developed rather than dropping out of school, which is less concerning in developed countries where compulsory education is enforced, unlike the Dominican Republic in past decades (Pfeifer & Cornelißen, 2010; Rees & Sabia, 2010).[2] In line with our findings, Ransom & Ransom (2018) find no effect of high school sports on educational outcomes in the United States.

2 Baseball in the Dominican Republic

2.1 Pre-MLB local baseball cultures

Baseball was introduced to the Dominican Republic from neighboring Cuba in the late 19th century and took root in the capital, Santo Domingo, with encouragement from wealthy students exposed to the sport while attending school in the United States.[3] Baseball fields soon appeared throughout Santo Domingo as the sport became popular among the working class. Baseball then quickly diffused outside the capital by way of sugar production.

Sugar refineries, mostly US-owned, sponsored baseball as a diversion for cane cutters during the months they were idle from the fields. The Dominican sugar industry enjoyed explosive growth in the early 20th century, and planters filled labor needs by importing thousands of workers, mostly from Haiti and the British West Indies. Large concentrations of idle working-age men allowed teams to play organized baseball games and tournaments. Fierce rivalries developed between refineries, as tight-knit communities surrounding refineries identified with and supported their local teams. The sugar industry existed almost exclusively on the southern coast, with the highest concentration of mills in the southeast near San Pedro de Macorís. The uneven diffusion of baseball, starting in Santo Domingo

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[2]Eide & Ronan (2001) finds evidence that sports participation has a negative effect on the educational attainment of white males but a positive effect for black males. Harris (2014) finds no effect of sports participation on the educational attainment of black males.

[3]This subsection is based on Klein (1991, 2014) and Ruck (1998).

before spreading via sugar estates clustered on the southern coast, generated variation in local baseball cultures over space that predates exposure to MLB investment and recruiting.

2.2 MLB's entry into the Dominican Republic

Before 1965, MLB teams devoted substantial resources to identifying talented American ballplayers in their mid-teens and training them for several years in hopes of signing them once they turned eighteen.[4] By the late 1950s and early 1960s, however, teams felt that this system of labor recruitment cut into profits: competition over prospects led to the payment of large bonuses to rookies, and ball clubs in big cities had the resources to sign the best players, leading to competitive imbalance and, therefore, lower attendance at games.

In 1965, the league introduced a draft and stricter age minimums to promote competitive balance and eliminate excessive bonuses. Rather than directly signing with a team, prospects entered a draft in which teams would take turns picking players in reverse order of their records from the previous season. The draft involved many rounds, with each team having the opportunity to select a player in each round. The team that drafted a player had exclusive rights to negotiate with and sign him to a contract. Players were not eligible for the draft until graduating high school, continuing a rule prohibiting teams from signing players before age eighteen. Players who went to college were not eligible for the draft until completing their sophomore year and reaching age twenty-one.

The new rules were written with American ballplayers in mind since Americans filled most MLB roster spots. Those from outside the United States were exempted because their eligibility would be difficult to verify, and many of them were already under contract to clubs in their home countries. These changes inadvertently created powerful incentives to focus on the development and recruitment of foreign players. The draft reduced the probability that a team would sign a domestic player that it scouted and developed, and the stricter age minimums reduced the incentive to invest in developing young talent since other teams

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[4]This subsection is based on Bailey & Shepherd (2011).

would likely see players' performance by the time they became eligible to be signed. In sum, the rules reduced the expected return on investment in domestic talent.

Relocating scouting activities abroad occurred slowly, as teams were unaccustomed to recruiting outside the United States. In the 1970s, teams increasingly evaded the draft by moving their scouts to Latin America—or, more precisely, the circum-Caribbean—where baseball was popular. Cuba had been by far MLB's most important source of foreign players but was left out of this new wave of recruitment due to the US embargo. Puerto Rico, a US territory, was heavily targeted by scouts until Puerto Ricans were subjected to the draft in 1989. The two other loci of recruitment were Venezuela and the Dominican Republic, where MLB teams opened academies to develop local players. In 1977, the Toronto Blue Jays opened the first academy in the Dominican Republic. By 1990, thirteen teams had academies in the Dominican Republic, and by 2003, all 30 MLB franchises maintained academies there. In 1985, Minor League Baseball (MiLB) founded the Dominican Summer League, the first affiliated league outside of the United States and Canada.

2.3   Dominicans in American professional baseball

The number of Dominicans playing American professional baseball closely tracks MLB's entry into the Dominican Republic (see Figure 1).[5] The first Dominican in the minor leagues debuted in 1925, and the first Dominican in the majors debuted in 1956, although he was a US citizen who attended high school in New York.[6] Most Dominicans were effectively barred from American baseball until the first Black player was signed by a major league team in 1947 (Kurlansky, 2010). Few Dominicans played professionally in North America before the 1970s. From the late 1970s, the number of Dominicans entering American professional baseball grew steadily. By the 2000s, around one in ten MLB players and one in four MiLB

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[5]We refer to MLB and affiliated leagues as American professional baseball for simplicity despite some teams in Canada because the leagues are based in, and predominately operate in, the United States. The major leagues existed for nearly a century before expanding into Canada.

[6]Major League Baseball consists of the National League and American League, often called the major leagues or majors. Minor League Baseball serves as a developmental system for MLB and is often referred to as the minor leagues or minors.

players hailed from the Dominican Republic (Cary, 2007).

From the beginning, the epicenter of Dominican baseball has been San Pedro de Macorís, which produces by far the most MLB players per capita of any city in the world (Florida, 2019). In 1977, the number of players in American professional baseball per capita from San Pedro was three times higher than any other province and nine times the national average; San Pedro represented just three percent of the population but 26 percent of the professional ballplayers. Between 1977 and 2010, 15 percent of new Dominican professional ballplayers came from San Pedro. According to Ruck (1998, p. xi), "[I]f the Dominican Republic has become the epicenter of Caribbean baseball, San Pedro de Macoris is its Mecca."

The other hotbeds of talent are primarily on the southern coast (see Figure 2). La Romana, which borders San Pedro de Macorís, had the second highest rate of player production in 1977 and is third for the period 1977 to 2010. Two other neighboring provinces, Hato Mayor (sixth from 1977-2010) and El Seibo (eighth) are also among the top producers of talent per capita. Santo Domingo—including the Distrito Nacional, which split off in 2001—produced the largest share of players (30 percent) but ranks ninth in per capita terms. The only exception to this geographical pattern is Monte Cristi (third in 1977, fourth since) on the northern coast bordering Haiti.[7]

2.4   Baseball training and MLB recruiting

Dominican boys learn and play baseball informally from an early age.[8]   Around age thirteen or fourteen, though sometimes younger, the most talented players are identified by and contract with *buscones*, or independent trainers, who provide daily instruction in baseball skills.[9]   Players can first legally sign a professional contract with a ball club at sixteen and a half years old, but *buscones* tend to continue developing players until they are

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[7]Santiago, the second largest city, is in the north and is tied for fourth for total number of professional players but ranks 18th per capita.

[8]This subsection is based on Klein (2014).

[9]*Buscones* also provide food and housing, secure tryouts, and assist in negotiations with professional clubs. In return, buscones receive a percentage of their pupils' signing bonuses.

signed, sometimes at ages seventeen or eighteen. Players then reside and train daily at their respective MLB team's Dominican academy for up to three years.[10] Successful recruits move on to minor leagues in the United States. While the academies gave players some language and cultural instruction, they did not consider general education until 2010, and even then the focus was on identifying programs rather than implementing them.[11]

Most training is unregulated and outside of the academies, so it is difficult to know precisely the size of the market. Estimates of those training full time for professional baseball vary widely, from 21,000 (Dominican Republic Ministry of Education, 2018) to more than 100,000 (Finkel et al., 2012), or about 3 to 15 percent of boys ages 12 to 19. The Dominican Ministry of Education, which provides the low-end estimate of full-time trainees, estimates that there are 1,400 independent training academies in operation. According to ENTRENA et al. (2022), 97% of prospects never sign a contract with an MLB team.

2.5   Baseball and the (perceived) returns to education

The extremely low odds of making it to the Major Leagues should not significantly impact the returns to education for Dominican boys. According to ENTRENA et al. (2022), only 3% of prospects ever sign a contract with a professional team, and of those only 2% make it to the MLB—that is, about 0.06% of prospects eventually play in the MLB. The Baseball Island Foundation (2024) offers an even bleaker picture, claiming that just 2% of prospects sign contracts to train at an MLB academy, 0.6% make it to the minors, and just 0.03% make it to the majors.

Still, the perceived returns to education may be shaped by baseball, since young prospects overestimate their chances of success and because MLB salaries are very high. In a recent study, 34% of prospects answered that over 20% of their peers would sign a contract, and 40% answered that 10 to 20% of their peers would sign a contract (ENTRENA et al., 2022).

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[10]The academies have them play in the Dominican Summer League, a branch of affiliated Minor League Baseball.

[11]https://www.mlb.com/news/mlb—dominican-republic-educational-initiatives/c-31428246

In 1990, the minimum salary in the MLB was $100,000, and the average was $597,537 (Edmonds, 2018). By comparison, the Dominican GDP per capita was around $2,000 in 1990. Minor league salary data are not as widely available, but the existing information makes clear that the minor leagues do not offer much upside: before the first collective bargaining agreement in 2023, MiLB salaries ranged from $4,800 in rookie leagues to $17,500 in AAA. Typical signing bonuses for Dominicans in the early 2000s were between $5,000 and $8,000 (Meyer & Kuhn, 2008), and *buscones* routinely take around a quarter or a third of the bonus (Klein, 2014). GDP per capita in the Dominican Republic today is around $8,500. Jensen (2010) estimates that the mean earnings of Dominicans who complete secondary school are over 40% greater than those of workers who only complete primary school. In sum, most boys are better off staying in school given the infinitesimal chances of making it to the MLB and the small payoff from making it to the minor leagues, which is also unlikely. Large numbers of boys should be drawn out of school to train for baseball only if baseball affects the *perceived* returns to education.

Many have argued that baseball has had a large negative impact on educational attainment in the Dominican Republic. Wasch (2009, p. 107) shows that boys and girls enter the Dominican educational system at the same rate but that boys drop out disproportionately around the age of baseball recruitment, arguing that this pattern is circumstantial evidence that families choose baseball over school. Articles in legal journals likewise claim that MLB's presence deters boys from attending school (Gentile, 2022; Hanlon, 2013; Kalthoff, 2013; Nieves Murphy, 2023; Ottenson, 2014; Spagnuolo, 2003; White, 2017; Williamson, 2013), as do articles published by think tanks (Council on Hemispheric Affairs, 2010; Lisman, 2019). Similar sentiments are echoed in popular outlets: VICE declares an "education crisis" (VICE Sports, 2015), and *The Nation* describes MLB recruiting as "strip-mining the Dominican Republic for talent. . . with no responsibility for who gets left behind" (Zirin, 2005). A director of the popular documentary *Ballplayer: Pelotero* reports meeting boys whose parents encouraged them to drop out: "[Y]ou can either go to school. . . or you can

play baseball and maybe win the lottery" (Page-Kirby, 2012).

3   Census and baseball data

We use data from Dominican national censuses for 1981 (8.5% sample), 2002 (10%), and 2010 (10%) from IPUMS International (Minnesota Population Center, 2020). The data include demographic information (i.e., birth year, sex, province of birth, and province of residence) and educational outcomes (i.e., attendance and years of schooling). The 1981 census was conducted just after MLB's entry, when MLB's presence was still limited and only a couple teams operated training facilities; the 2002 and 2010 censuses were conducted when MLB's activities were extensive. The 2010 census includes both individuals who were teenagers before and those who were teenagers after MLB's entry.

Data on the birthplaces of Dominicans who played in the MLB or MiLB by 2010 come from The Baseball Cube, an online aggregator of baseball-related data. The website includes information on all major leaguers since 1871 and all minor leaguers in affiliated leagues since 1977. Few Dominicans played professionally in the United States prior to 1977, so the data include the vast majority of Dominican professional ballplayers.

The level of analysis is the province, of which there are 31 plus the national district. A lower level of analysis is not possible given significant changes over time in municipal borders and imprecise reporting of births in the baseball data. We combine the *Distrito Nacional* with the province of Santo Domingo, which split in 2001, since both jurisdictions may be referred to as Santo Domingo in players' reported births, giving us 31 units of analysis. For all regressions, we collapse individual-level data to the provincial level.

Before introducing the empirical strategy, it is worth observing summary statistics. Figure 3 provides average educational outcomes for four-year birth cohorts for two groups of boys: San Pedro de Macorís and thirteen provinces that had no professional (MLB or MiLB) ballplayers active in 1977, respectively.[12] This provides the cleanest, albeit imperfect,

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[12]Thirteen provinces had no professional ballplayers active in 1977: Baoruco, Dajabón, Duarte, Elias

attempt to separate provinces into treatment and control groups. Although baseball is a national pastime, Figure 4 makes clear that some areas consistently produce much more baseball talent than others. San Pedro stands alone. Comparing cities, not provinces, Florida (2019) finds that San Pedro produced four times more MLB players per capita since 2000 than any other city in the world, with San Cristóbal in the Dominican Republic coming in second. Several provinces have still not produced a single MLB player.

All three educational outcomes increase across the ten birth cohorts, with San Pedro's outcomes being consistently better, and the "control" provinces being consistently worse, than the national average (not shown). Boys' primary school (grade 8) completion across the entire country increases from 38% for 1951-54 births to 75% for 1987-90 births. Boys' secondary school (grade 12) completion increases from 25% for 1951-54 births to 44% for 1987-90 births. And their average years of schooling increases from 6.4 to 9.7.

San Pedro and the "control" provinces in Figure 3 follow these national trends and, importantly, parallel each other for all three measures of educational attainment. There is no marked change in the difference between the two groups' outcomes over time. Certainly, there is no major convergence over the periods in which teenagers may be affected by MLB recruiting. Secondary (12th grade) completion somewhat converges in birth years in the 1960s, but the two groups closely track each other thereafter. With MLB exposure ramping up over this period, we would expect greater convergence in later years; we see no such pattern. There is no visual indication of an educational crisis, as has been alleged, as baseball's epicenter, San Pedro, has superior educational outcomes across the entire period, before and after MLB's entry. These facts align with Klein (2014), who claims that the MLB Commissioner's Dominican Office informed him that ballplayers slightly exceeded the national average for high school completion.

Piña, Independencia, La Altagracia, María Trinidad Sánchez, Monte Plata, Pedernales, Samaná, San José de Ocoa, Sánchez Ramírez, and Santiago Rodríguez.

4 Econometric Framework

We identify the effect of baseball on Dominican education using an exposure research design. This strategy relies on finding differences in exposure to the policy. Examples of other exposure research designs include studies on migration policy changes (Abarcar & Theoharides, 2021; Khanna & Morales, 2017), studies that use vote shares (Palsson, 2022) or demographic shares (Jones et al., 2017), and any Bartik/shift-share design (Goldsmith-Pinkham et al., 2020). In this case, we need variation in exposure across provinces that caused variation in how the MLB draft affected incentives to pursue baseball instead of education.

Our measure of exposure is the number of active MLB and MiLB players per capita in the province in 1977, the year the first MLB academy opened in the Dominican Republic.[13] Although some Dominicans did play professionally in North America prior to MLB's entry, MLB teams did not engage in player development and skimmed only those players who were impossible to ignore (Klein, 2014). In 1977, there were only 90 Dominicans active in American professional baseball, so it is unlikely that many young boys saw baseball as a viable career path. But investments in player development at the academies led to 1,078 professional players in 2009.[14] MLB player development had created a new professional path.

We argue that the exposure measure was important to the decision between baseball and education because local baseball talent shaped the viability of pursuing professional baseball. We are agnostic about the mechanisms through which the local talent influenced outcomes—e.g., better competition, better training, more role models, access to scouts, etc.—and, instead, simply assume that a boy born in a community with more professional players saw greater opportunities to reach American professional baseball than one in a community with fewer. A boy growing up in San Pedro de Macorís—"that town with all the

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[13]The year 1977 is also chosen in part because it is the first year for which MiLB data are available from The Baseball Cube.

[14]We use 2009, instead of 2010, here and in the appendix to exclude players in the Dominican Summer League, who are included in The Baseball Cube data from 2010 forward.

shortstops" (Kurlansky, 2010, p. 97)—must see baseball more optimistically than a boy in Baoruco, Independencia, or Pedernales—provinces which have produced no major leaguers.[15] Consistent with this assumption, the exposure measure strongly predicts the home provinces of future baseball players. Figure 4 shows that the Pearson correlation coefficient for the number of active players per capita in 1977 and in 2010 is 0.84.[16] Furthermore, our data on active players aligns well with experts' views on the provinces that traditionally have had the highest concentration of informal training.[17]

To find the effect of baseball on education, the identifying assumption is that the distribution of baseball talent in 1977 is unrelated to factors affecting changes in education outcomes except through the channel of fostering baseball talent after the arrival of the academies. The initial distribution of baseball talent will be related to local factors, including initial levels of education. For example, provinces with lower economic opportunity might have produced more baseball players and lower levels of education. But the identifying assumption is not violated if exposure is related to the initial levels. The key is that exposure must not predict changes in the absence of the change in player development policy. We assume this is satsified because the effect of exposure comes through a change in American policies that is unrelated to local trends in education. Our assumption parallels other papers that look at the effect of American migration policies on educational choices (Abarcar & Theoharides, 2021; Khanna & Morales, 2017). To test the plausibility of the assumption, in many of our analyses we inspect the pre-trends.

One concern with our analysis is whether the census counts participation in a baseball academy as enrollment in school. The options in the census questionnaires were standard

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[15]Shortstop is one of the most important of the nine defensive positions in baseball.

[16]Even when we exclude San Pedro de Macorís, the largest producer of baseball talent, the coefficient is 0.67. The only visible exception is Peravia, which in 1977 had produced the sixth highest number of professionals per capita but which has emerged as the second top producer since then. When Peravia is excluded, the correlation coefficient is 0.94.

[17]Notably, six of the seven provinces with the most training programs identified in the 2022 USAID-sponsored study on Dominican baseball also ranked among the top seven provinces with the most professional players active in 1977, as well as those with the most professional debuts between 1977 and 2010 (ENTRENA et al., 2022).

(e.g. elementary school, secondary school, etc.), and academies would not have qualified for any because they did not offer general education. But some respondents may have misinterpreted the questions and included their child's enrollment in a baseball academy as school attendance. But the concern about baseball leading to dropouts is the thousands of children leaving school for informal training in the hopes of getting one of the few academy spots. Even if some are miscounted as enrolled in school, it should have a trivial impact on the outcome variable since the number of children enrolled in the academies is small.

Two threats to identification are worth discussing. First, there may be concern that ballplayers who dropped out of school and successfully played professional baseball have dropped out of the census by migrating to the United States, thereby biasing the estimated effects towards zero. This is not a major concern. The number of Dominicans debuting in the MLB or MiLB is less than 0.25% of the total number of Dominican males in the latest years of the sample, when MLB's presence is greatest. Many players likely return to the Dominican Republic after their baseball careers end and would thus still appear in the census. More than nine out of ten Dominicans who play in the Minors never make it to the MLB and are released shortly after arriving stateside, around ages 19 to 20 (The Baseball Island Foundation, 2024). In any case, the analysis in Section 5.3 avoids this potential pitfall by considering changes in school attendance among boys ages 13 to 16, before they would have emigrated.[18]

Second, there may be concern that boys in areas where baseball is less popular may relocate to areas with better training facilities, particularly to gain exposure to MLB teams near their academies. To the extent this occurs, our province-level exposure measure might not accurately capture treatment. Once again, this is not a major concern. If there were a large outmigration of ballplayers from less exposed communities to more exposed communities, we should see a correspondingly large increase in the number of professional

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[18]From a policy perspective, we perhaps should not care if players who make it to professional baseball do not make it into the census sample. Those players trained for baseball and succeeded, and even those who have short careers but remain in the United States are likely to attain much higher material prosperity given the large difference in living standards between the countries.

ballplayers per capita from those communities after 1977. We do not. Thus, the distribution of home provinces for active players in 1977 strongly predicts the number of players that province produced from 1977 to 2010.

In addition to the exposure design, in some analyses we exploit that the exposure differentially affected boys and girls. Since girls do not play professional baseball, the allure of potential high-returns should only affect the boys. If MLB negatively affects boys' educational outcomes, we should expect to see that boys' outcomes worsen relative to girls after MLB's entry in provinces more exposed to the shock. This approach has the advantage that it allows outcomes across provinces to vary over time. The identifying assumption is that boys' educational outcomes would change at the same rates as girls' within provinces in the absence of the MLB's entry conditional on sex-specific birth cohort fixed effects. That is, the model controls for general changes in sex-specific outcomes over time under the assumption that the relative changes in sex-specific outcomes are common across provinces.

In the following equations, our exposure variable is written as $Pre\text{-}MLB_p$. It is the total number of active players in the MLB or MiLB in 1977 who were born in province p divided by the population of p in 1981.[19] For ease of interpretation, we standardize $Pre\text{-}MLB_p$ to have a mean of zero and a standard deviation of one.

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[19]Several provinces were formed between 1982 and 2001 by splitting off of other provinces, but we use modern provincial definitions. To estimate population in 1981 for provinces which did not yet exist, we reassign some of a "mother" province's 1981 population to the new province, with the share based on the relative populations of the "mother" and new provinces in 2002.

5 MLB's entry and educational outcomes

5.1 Educational outcomes across birth cohorts in the 2010 census

The first test of whether teenage boys' educational outcomes respond to MLB's entry into the Dominican Republic uses only the 2010 census and is based on the following regression:

$$Education_{pt} = \sum_{s \neq 1959-62} \gamma_s Pre\text{-}MLB_p \cdot \mathbb{1}[t = s] + \theta_p + \delta_t + \varepsilon_{pt} \tag{1}$$

where $Education_{pt}$ is an educational outcome (i.e., years of schooling or completion (0/1)) for boys born in province p in birth cohort t. θ_p are province fixed effects to control for any time-invariant factors at the province level that are correlated with education, and δ_t are birth cohort fixed effects to control for any factors that are common across all provinces but change over time and are correlated with education. To ensure sufficiently large cohort sizes, four years of births are grouped together. The reference cohort consists of males born between 1959 and 1962, since boys born immediately thereafter were the first to be of primary school (grades 1-8) age with MLB academies in operation. Men born before 1951 are excluded because there are too few observations per birth cohort, as are men born after 1990 to keep groups of four years and because many are too young to be expected to finish secondary school. Girls are excluded because they are not recruited for professional baseball. In this and in the following equations, we do not include any other controls because of data scarcity. We assume that the relevant changes are captured in province and birth-cohort fixed effects.

The coefficients of interest are the γ_s. Since we use both birth cohort and province fixed effects, the γ_s give us the effect of a one standard deviation increase in baseball exposure by birth cohort. The hypothesis derived from conventional wisdom is that the greater exposure should lead to lower educational outcomes after the establishment of the first academy in 1977; or $\gamma_s < 0$ for all birth cohorts after 1962. The γ_s before 1962 allow us to test the

plausibility of the parallel trends assumption.

Figure 5 displays the coefficients from Equation 1 for our three outcomes. The coefficients for the pre-treatment period are consistent with the parallel trends assumption.[20] For primary school (grades 1-8), only one is statistically significant at the 10% level, but the F-test for joint significance of pre-1959 coefficients produces a p-value of 0.19. For high school completion, none of the pre-treatment coefficients is statistically different from zero, and the F-test for joint significance produce a p-value of 0.53. Finally, for years of school, there is one pre-treatment coefficient significant at the 10% level, with the p-value from the F-test for joint significance at 0.20. The absence of significant pre-trends gives reason to believe that the parallel trends assumption holds after 1965.[21] In any case, to the extent that there may be concern that more treated provinces were already experiencing a relative decline in educational attainment prior to the MLB's entry, the results would be biased downwards—that is, biased towards finding a negative effect.

After treatment, across all three outcomes, there is no evidence for a treatment effect. All coefficient estimates are small and none are statistically distinguishable from zero. Using a linear combination of the post-treatment coefficients, we do find a negative effect for two outcomes, though neither is statistically significant: a one standard deviation increase in local 1977 baseball talent results in a decrease in the probability of completing high school of 0.1 percentage points [95% CI: -1.3, 1.1] and 0.04 fewer years of schooling [95% CI: -0.15, 0.14].[22] But the estimated effect on completing primary school is slightly positive (0.7 percentage points [95% CI: -0.7, 2.0]). This is interesting because this outcome is theoretically the most

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[20]We are aware that most studies are underpowered when testing for differences in pre-trends (Roth, 2022), but the standard issue is that underestimating differences in pre-trends leads to overestimating the size of the treatment effect. Since our study finds precise null effects, the story would have to be that the differential trends exactly cancel out the effect size over several decades of birth cohorts.

[21]Note that, although a pre-treatment coefficient is marginally significant for two of the outcomes, the reference year outcome is low relative to subsequent periods. For example, the relevant pre-treatment period is statistically indistinguishable from the cohort immediately after the reference group, 1963-66, for both outcomes (p=0.20 and p=0.21, respectively). If we used 1963-66 births as the reference group—which could be justified given that MLB's presence was still small for years after the Blue Jays opened the first academy in 1977—no coefficient, before or after treatment, would be statistically significant (results omitted).

[22]We take an average of the coefficients using the `lincom` command in Stata.

at risk since students begin training during primary school around age 12. Based on the 95% confidence interval, the probability of completing primary school did not decrease by more than 0.7 percentage points. In other words, we find precise null results.

The results are robust to several important changes to our specification. The appropriate grade level to consider is uncertain, since diminished educational investment may be a process over multiple years as both talent and other opportunities reveal themselves. Presumably, the impacts would be larger at later ages, although on a smaller fraction of the population. Appendix Figure A1 reveals that the results do not change for any grade level from 6 to 12. The results are also robust to using the number of professional baseball players from 1977 to 2010 per capita as an alternative measure of exposure (see Appendix Figure A2). Finally, the results are robust to excluding San Pedro de Macorís, meaning that the results are not driven by an outlier (see Appendix Figure A3). If professional baseball negatively affected education, boys in communities more exposed to the shock would have relatively worse outcomes after MLB's entry; they do not, suggesting no such effect.

Since we consistently find small, null effects, in the appendix we calculate the design's power using the methods from Black et al. (2022). We find that while there are some large effects that the design would be underpowered to detect with just a single regression, the probability of having a true large negative effect and estimating a small positive coefficient (as we do) is effectively zero.

5.2   Comparing boys to girls

One might object to our assumption that educational trends for males across provinces are similar. This could cause us to miss important trends happening within provinces. To address this concern, we introduce another analysis that includes female school attendance. We adjust Equation 1 as follows:

$$Education_{pt} = \sum_{s \neq 1959-62} \gamma_s Pre{-}MLB_p \cdot Male_i \cdot \mathbb{1}[t=s] + \theta_p \cdot \delta_t + \theta_p \cdot Male_i + \delta_t \cdot Male_i + \varepsilon_{pt} \quad (2)$$

where $Male_i$ is an indicator variable that takes the value of 1 for boys and 0 for girls. Birth cohort-specific province fixed effects allow educational outcomes to evolve commonly across genders over time within a province.

Equation 2 is a within-province model, testing whether boys' educational outcomes change—or, in this case, worsen—relative to girls over time in communities more exposed to MLB's entry. If MLB negatively affects boys' educational outcomes, we should expect to see that boys' outcomes worsen relative to girls after MLB's entry in provinces more exposed to the shock. This approach has the advantage that it allows outcomes across provinces to vary over time. The identifying assumption is that boys' educational outcomes would change at the same rates as girls' within provinces in the absence of the MLB's entry conditional on sex-specific birth cohort fixed effects. That is, the model controls for general changes in sex-specific outcomes over time under the assumption that the relative changes in sex-specific outcomes are common across provinces.

The results for Equation 2 are shown in Figure 6. Only one pre-1959 coefficient estimate is statistically significant across the three outcomes, for primary school completion, but in general the graphs indicate that there are no differential pretrends. The coefficient estimates after the reference period are usually positive and, in some cases, significantly different from zero. However, the reference year is essentially arbitrary and takes an anomalously low value—that is, both the pre- and post-treatment coefficients are positive. The pattern is clear across all three graphs that there is no major change over time and, certainly, no significant decline at any time that would suggest that professional baseball has a negative effect on education. The results are robust to using the number of baseball players from 1978 to 2009 per capita as an alternative measure of exposure (see Appendix Figure A4).

5.3 Robustness check: School attendance across censuses, 1981-2010

Our main analysis uses data from the 2010 census. The advantage of this approach is that our birth cohorts span 50 years, getting us pre-treatment cohorts. But there are two disadvantages. First, the educational outcomes reported in 2010 are retrospective and may be subject to reporting errors. Second, there may be athletes leaving school to attempt baseball then returning to school when that path fails, and retrospective data might have trouble catching those dynamics. This second concern is not a problem for the total effect of baseball on education, since it would mean that the MLB did not derail education. But this pattern would reconcile observations that baseball academies draw students away from school.

We address this concern by looking at school attendance across the 1981, 2002, and 2010 censuses. In these data sets, we can observe the current enrollment status of teenage boys, which overcomes the problem of retrospective reporting errors. The disadvantage to this approach is that we observe outcomes after the MLB baseball academies are established. Thus, an identifying assumption we have to make is that the effect of MLB exposure varies over time. This assumption is reasonable since a baseball career seems more viable in 2010, when there were 10 times as many players as there were in 1981.

With the data, we do the following regression:

$$Attendance_{apc} = \sum_{s>1981} \gamma_s Pre\text{-}MLB_p \cdot \mathbb{1}[c = s] + \theta_p + \mu_a \cdot \delta_c + \varepsilon_{apc} \qquad (3)$$

where $Attendance_{apc}$ is average school attendance for age a in province p in census year c. In this model, δ_c are census year fixed effects to control for any factors that are common across all provinces but change over time and are correlated with education. Age-specific census year fixed effects control for age-specific changes in attendance common across the country over time. The reference year is 1981. Although 1981 falls after the first MLB

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academy opened in 1977, only two teams had academies then, and the academies were small compared to their modern form. The first fully modern academy opened in 1986, and MLB saw its role in the Dominican Republic as haphazardly skimming talent until the 1990s (Klein, 2014). If MLB has an effect on attendance, the effect should grow after 1981.

The results of Equation 3 are shown in Table 1. Only boys ages 13 to 16 are included, since these are prime ages of recruitment and training for baseball prospects. Relative to 1981, a one standard deviation increase in the MLB exposure variable causes no decrease in school attendance in 2002; in 2010, a one standard deviation increase in the MLB exposure variable causes a decrease of 0.2 percentage points in the probability of attending school, but the difference is not statistically significant (see Column 1). Consistent with Section 5.1, the evidence does not suggest that MLB is negatively affecting Dominican boys' education: there is no change in school attendance in provinces where ballplayers tend to come from relative to other provinces after MLB ramped up investment in the Dominican Republic.

In Section 5.2, we did a within-province analysis by including girls in the regressions. We can do the same across censuses by adjusting Equation 3 as follows:

$$Attendance_{apc} = \sum_{s>1981} \gamma_c Pre-MLB_p \cdot Male_i \cdot \mathbb{1}[c = s] + \theta_p \cdot \mu_a \cdot \delta_c + \theta_p \cdot Male_i + \mu_a \cdot \delta_c \cdot Male_i + \varepsilon_{apc}$$

$$(4)$$

The results for Equation 4 are shown in Table 1, Column 2. Relative to 1981, the effect of MLB exposure for males in 2002 and 2010 is statistically indistinguishable from zero. That is, there is no evidence that the school attendance of males in baseball communities worsened relative to their female counterparts as MLB ramped up investment in the Dominican Republic. The magnitudes of the coefficients are tiny: the larger point estimate, for 2010, indicates that a one standard deviation increase in pre-MLB baseball culture decreases the probability of school attendance by 0.5 percentage points for boys ages 13 to 16. Once again, the evidence does not suggest that MLB negatively affects Dominican boys' education, and certainly not on the scale suggested by popular press.

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5.4   Robustness check: 2006 expansion of US visas

Chon (2020) also finds no effect of MLB recruitment on Dominican boys' educational outcomes but exploits the expansion of US visas in 2006 to identify the change in school attendance between the 2002 and 2010 censuses. A null result from that identification strategy may not be informative because there is no clear change after 2006 in the trend of the number of Dominicans playing American professional baseball, as seen in Figure 1.3 of that study (reproduced in the online appendix as Figure A8). It is not obvious that the increase in the number of visas would change boys' perceived returns to education.

However, according to Klein (2014), the supply of H2B visas was limited before 2006 such that baseball teams had to be selective in sending minor leaguers to the United States, resulting in a backlog of players left in the Dominican academies. The Compete Act of 2006 expanded the supply of H2B visas for minor league baseball players, among other workers, and relieved the backlog. It is possible that this change affected boy' perceived returns to education, knowing that the chances of playing in the United States improved.

As a robustness check, we follow Chon (2020) in testing whether educational outcomes changed between 2002 and 2010 in response to the 2006 US visa expansion. The difference between our work and the previous study is that Chon defines treatment as binary and only includes municipalities close to MLB academies in the treatment group. This classification is problematic because there are some areas, such as Peravia and Monte Cristi, that produce professional ballplayers at a high rate but fall in the control group. In this analysis, since the policy change occurs in 2006, we tweak the exposure variable to include all ballplayers who debut in American professional baseball between 1978 and 2006 and divide it by the population of the province in 2002.

Additionally, following Chon, instead of comparing boys to girls as we do elsewhere, we compare boys age 14 to 17 (treated) to boys age 18 to 21 (control). When the US visa expansion took effect in 2007, boys aged 11 to 14 were young enough to respond to the policy change and prepare for MLB academy tryouts, whereas boys slightly older already

would have needed to prepare for years. Boys aged 11 to 14 would be 14 to 17 years old in 2010.

Table 2 displays results for regressions reevaluating the effect of the 2006 US visa expansion on boys' education, approximating the analysis in Chon (2020). If the visa expansion worsened educational outcomes, boys age 14 to 17 in the census should fare relatively worse than boys 18 to 21 in municipalities with stronger preexisting baseball cultures after the policy change. In reality, there is no evidence from the triple-differences model to suggest that their outcomes worsened, as the differences are all small and statistically insignificant.

6   Discussion and conclusion

This paper studies changes in educational outcomes across provinces before and after MLB's entry into the Dominican Republic and finds no evidence that professional baseball worsens outcomes. The result is surprising in light of abundant statements made in the popular press and legal journals attributing poor educational outcomes to recruitment for professional baseball. It is also not difficult to imagine that young boys in a developing country would take their chances at making millions of dollars, especially when seeing so many of their countrymen playing professionally on television. Yet, the educational outcomes of boys in communities more exposed to MLB's entry do not worsen relative to boys in less affected communities in response to MLB recruiting, and boys' outcomes likewise do not worsen compared to girls in those communities. Poor educational outcomes for boys in the Dominican Republic are not the result of MLB recruiting.

A simple explanation for the null result is that poor educational outcomes are a reflection of an underperforming educational system rather than of baseball. Educational outcomes in the Dominican Republic over the period studied are generally poor, not only for baseball players. Many ballplayers likely would not have been in school anyway; of all Dominican

males born in the early 1970s, around half completed 8th grade and only a quarter finished 12th grade. As Klein (2014) notes, low education levels among ballplayers does not mean that they are less educated than the population at large. Of the 30 boys that Klein (1991) followed in 1987-89, six (or 20%) had a high school diploma, which is not far from the national average of about 27% according to IPUMS census data, particularly for a small sample. More recently, Klein (2014) also claims that the MLB Commissioner's Dominican Office informed him that ballplayers slightly exceeded the national average for high school completion.[23] In general, Dominicans undervalue education, as the perceived returns to secondary education are extremely low despite measured returns (Jensen, 2010), and baseball prospects perceive a career path through education as complex and uncertain for them (ENTRENA et al., 2022).

Another explanation for the null result may be that dropping out of school may not be as common among baseball prospects as previously thought. According to ENTRENA et al. (2022), 96% of those surveyed still attended school, although mostly in non-traditional settings, and just 7% did not expect to attend school the following year. However, such attachment to schooling may be the result of recent efforts by MLB and partners to emphasize education and likely does not apply to earlier decades. Nonetheless, only 24% of respondents practiced baseball more than 20 hours per week, leaving ample time for education, and nearly three quarters expected to resume studies full-time if not signed to a professional baseball contract. The median prospect practices baseball 10 to 15 hours per week, which is comparable to the mean number of hours (11.6) that American high school athletes expect to participate in their primary sport in season (Gagliardi et al., 2020). Once again, however, the surprisingly low number of hours per day spent training may reflect recent concerns about boys' well-being, such that boys in decades past may have had more exhausting training schedules.[24]

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[23]Notably, although many prospects come from low-income backgrounds, 84.3% of the surveyed prospects have access to water within their home, which suggests that the prospects do not belong to the lowest income levels of the country (ENTRENA et al., 2022). Klein (1991, p. 69) reports that a "fair number" of rookies are the middle-class sons of journalists, clerks, and teachers.

[24]The Baseball Island Foundation (2024) describes the daily life of a 10-year-old ballplayer as involving eight hours of physical training, six days per week, 50 weeks per year, for nine years on average. The

Lastly, a related explanation for the null result is that the total number of boys seriously pursuing professional baseball may not be as large as speculated. Many of the supposed prospects may dream of a career in the MLB without giving up on other pursuits, no different than young athletes across the world, such that those who dropout for baseball and who otherwise would have remained in school represent only a tiny fraction of players. In this scenario, we may not have the power to detect an effect, but the effect would be small enough to be unimportant from a policy perspective and would not alter the conclusion that baseball is not causing an educational crisis.

Studying baseball and education in the Dominican Republic contributes to our understanding of the relationship between education and employment opportunities. Baseball is defined by high risk and high reward, like other careers in sports and entertainment and unlike careers previously studied. The Dominican Republic is an ideal location for studying the effect of such careers on education because of baseball's prevalence and the relative lack of other very lucrative career options. The absence of evidence that boys' educational outcomes respond to MLB recruiting suggests that careers defined by high risk and high reward are unlikely to shape educational decisions.

Future research paths may include understanding the contexts where sports or other high-risk professions have greater influence on educational outcomes. A closely related study, Rossi & Ruzzier (2018), finds that expanding access to male professional sports alters educational outcomes for men. But their context differs significantly from ours: they look at tertiary education while we look at primary and secondary; they look at how countries of varying incomes react to a broad change in European policy while we look at how a single, poor country responded to targeted recruiting; and, of course, they look at soccer while we look at baseball. Which of these differences is important to the differences in outcomes? Furthermore, the landscape of professional sports is changing. Thanks to reforms in enrollment transfer policies, revenue sharing, and name, image, and likeness (NIL)

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foundation does not provide evidence for these claims, however.

endorsements, athletes around the world can receive significant compensation for playing sports in American colleges. There are still many questions to explore.

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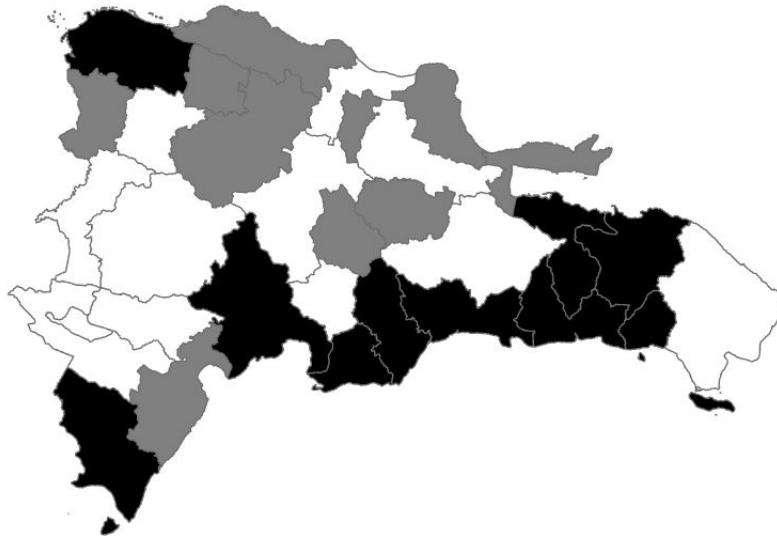
A Figures

Figure 1: Dominican players debuting in MLB and affiliated leagues, 1950-2009
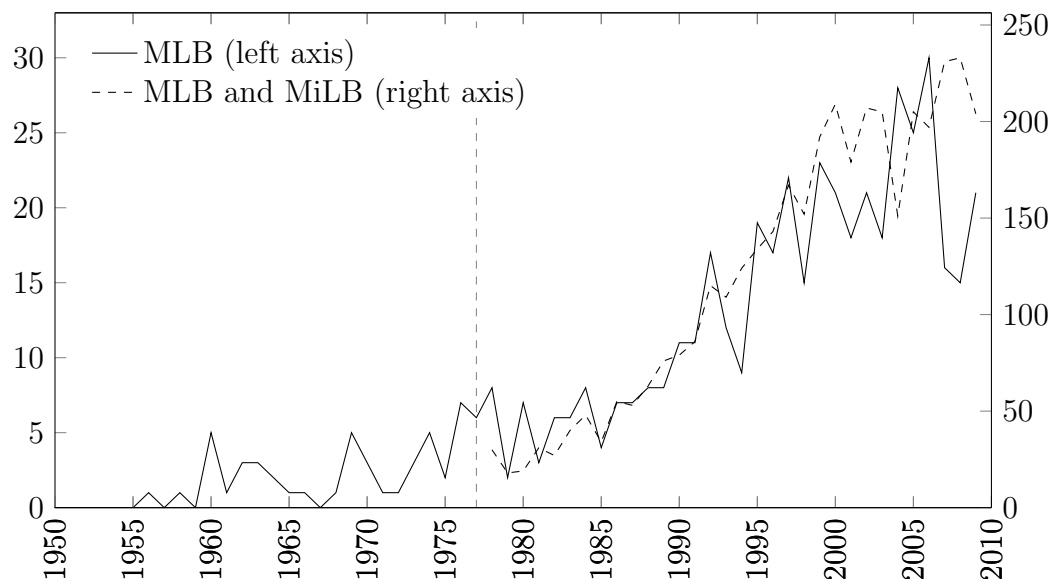
Notes: Data for the minor leagues are unavailable prior to 1978. No Dominicans played in the major leagues from 1876 to 1955. Each player is counted only once. Independent leagues are included. The Dominican Summer League is not included. The vertical dashed line in 1977 marks the year in which the first MLB academy opened in the Dominican Republic.
Sources: Baseball-Reference.com and The Baseball Cube

Figure 2: Per capita MLB and MiLB players, 1977-2010, by province

Note: Shading corresponds to terciles, with black representing the highest number of MLB and MiLB players born in a province per capita.
Source: Authors' calculations based on Baseball-Reference.com and The Baseball Cube

Figure 3: Educational attainment in selected provinces

(a) Primary school (grade 8) completion (0/1)
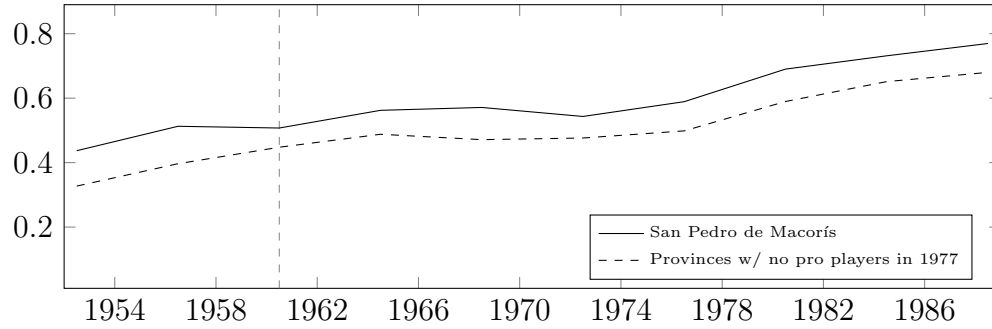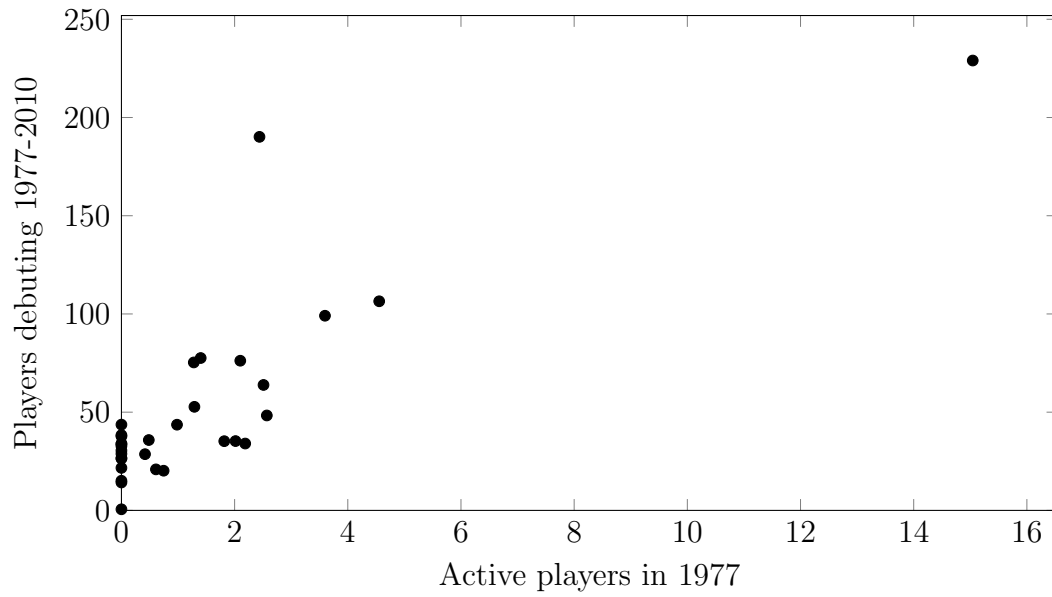

(b) Secondary school (grade 12) completion (0/1)
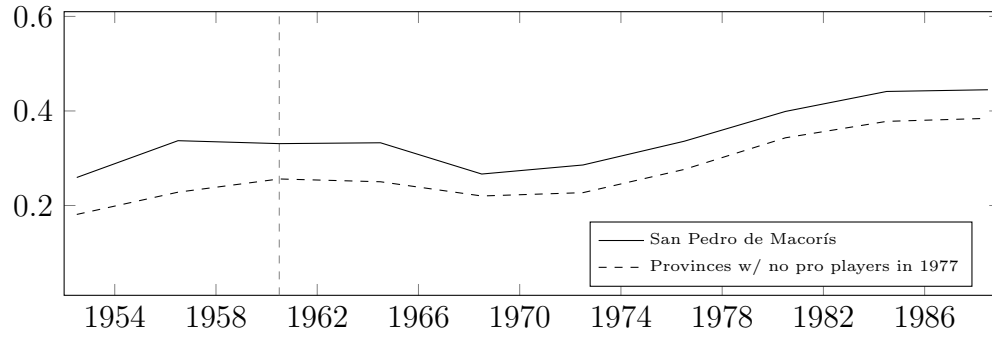
(c) Years of schooling
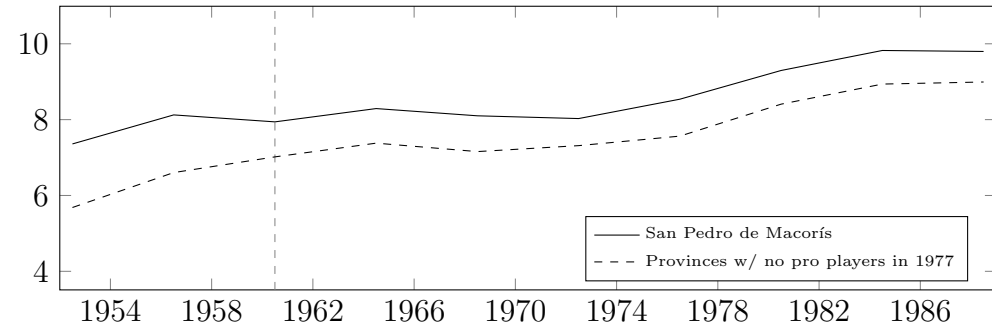
Notes: Averages are based on groups of four-year birth cohorts for boys only from the 2010 Dominican census 10% sample. The vertical dashed line marks 1959 to 1962 birth cohorts, which serve as the reference group in the difference-in-differences analysis.

Figure 4: Dominican MLB and MiLB players over time, by province of birth (per 100,000 population)

Sources: Baseball-Reference.com and The Baseball Cube

Figure 5: The effect of MLB on boys' education
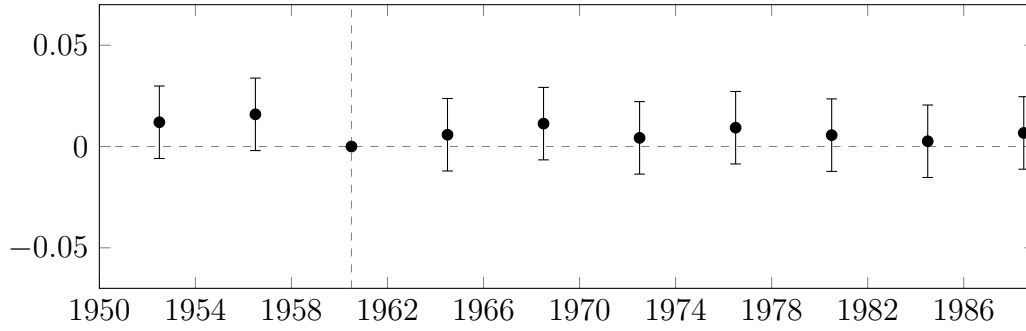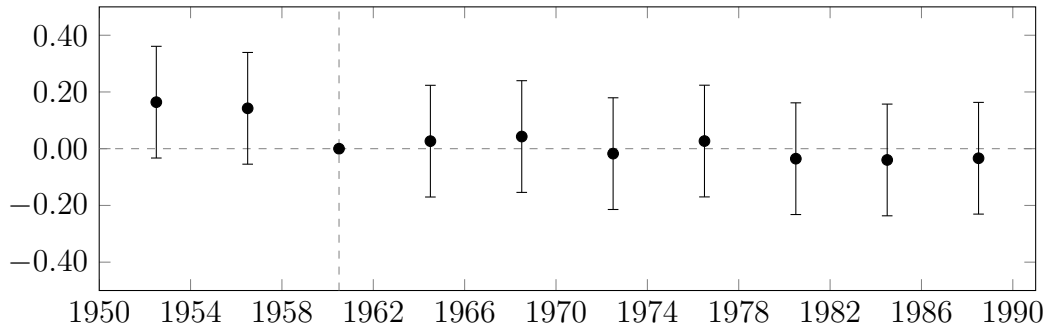
(a) Primary school (grade 8) completion (0/1)

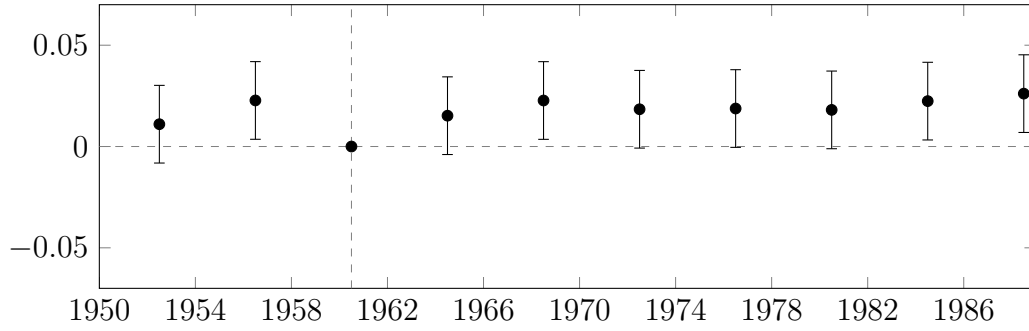(b) Secondary school (grade 12) completion (0/1)
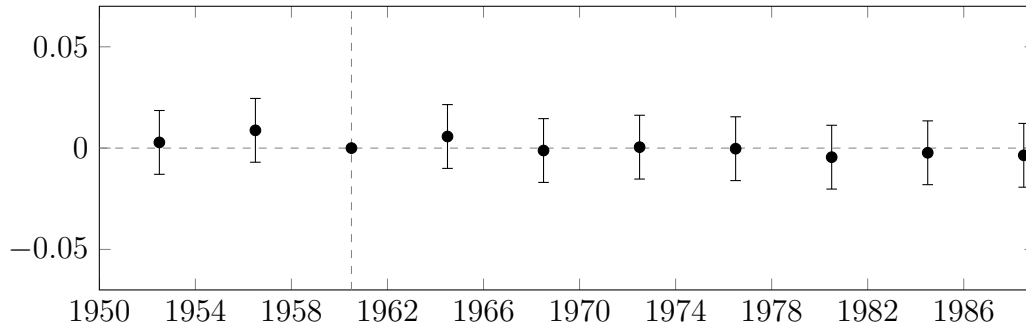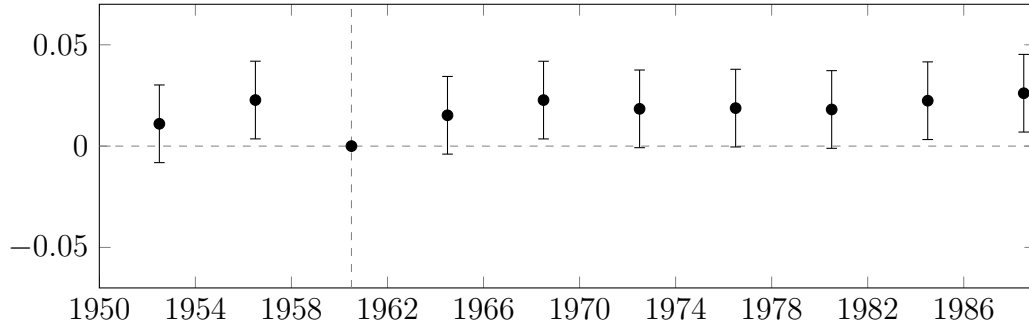

(c) Years of schooling

Notes: This figure is based on Equation 1. The dependent variable is shown above each panel. The x-axis depicts birth year. Coefficients correspond to the pre-MLB exposure variable interacted with birth-cohort dummies. Men born from 1959 to 1962 are the reference group. Error bars are 95 percent confidence intervals.

Figure 6: Comparing boys to girls: The effect of MLB on boys' education
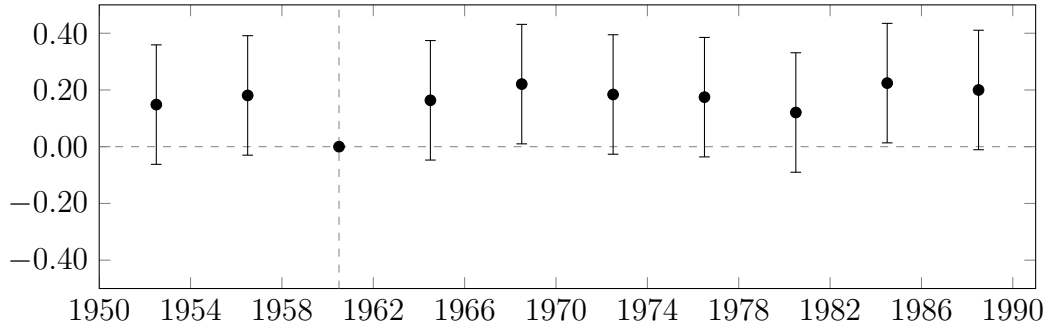
(a) Primary school (grade 8) completion (0/1)

(b) Secondary school (grade 12) completion (0/1)

(c) Years of schooling

Notes: This figure is based on Equation 2. The dependent variable is shown above each panel. The x-axis depicts birth year. Coefficients correspond to the pre-MLB exposure variable interacted with birth-cohort dummies and a male dummy variable. Men born from 1959 to 1962 are the reference group. Error bars are 95 percent confidence intervals.

B Tables

Table 1: The effect of MLB on school attendance across censuses, 1981-2010

	Exposure Measure	
	$Pre\text{-}MLB_p$	$MLB\ 1978\text{-}2009_p$
Panel A: Males only (N = 372)		
$Exposure \times \delta_{2002}$	0.002	0.001
	(0.005)	(0.005)
$Exposure \times \delta_{2010}$	-0.002	-0.002
	(0.005)	(0.005)
Panel B: Males and Females (N = 744)		
$Exposure \times \delta_{2002} \times Male_i$	-0.004	0.000
	(0.009)	(0.009)
$Exposure \times \delta_{2010} \times Male_i$	-0.005	-0.000
	(0.009)	(0.009)
Dependent variable mean:	0.84	0.84

Notes: This table is based on Equations 3 and 4. Coefficients in the first column correspond to the pre-MLB exposure variable $Pre\text{-}MLB_p$ interacted with census year dummies. Coefficients in the second column correspond to to players debuting 1977-2010 divided by the provincial population $MLB\ 1978\text{-}2009_p$ interacted with census year dummies. Census year 1981 is the reference group. Sample only includes ages 13 to 16. Standard errors are shown in parentheses. Significance levels are denoted by * p <.10, ** p <.05, *** p <.01.

Table 2: Reconsidering the effect of the 2006 US visa expansion on boys' education

Dependent variable:	Years of school	Primary completion
	(1)	(2)
Pre-2007 MLB$_p$ $\times \delta_{2010} \times Age$ 14-17$_i$	0.06 (0.11)	0.002 (0.008)
Observations	496	496

Notes: This table is based on Equation 3. *Pre-2007 MLB$_p$* is the per capita number of players debuting in American professional baseball from province p from 1978 to 2007, standardized to have a mean of 0 and a standard deviation of 1. Census year 1981 is excluded. Census year 2002 is the reference year. Following Chon (2020), boys ages 14-17 are the treatment group and boys ages 18-21 are the control group. Significance levels are denoted by * p <.10, ** p <.05, *** p <.01.