Avery and Levin, "Early Admission at Selective Colleges"

# Online Appendix: An Illustrative Example

These notes present a more detailed version of the example from Section II of the paper, with complete derivations of the equilibrium thresholds and payoffs. These notes are intended to be useful for teaching purposes, and so we reproduce some Figures from the paper for easy reference.

## 1. The Model of College Admissions

There are two selective schools, A and B, a third school C that admits all applicants, and a unit mass of students. Each student has an ability $v$ and a taste $y$. Abilities are uniformly distributed on $[0, 1]$ and tastes are uniform on $[-1/3, 2/3]$. Ability and taste are independently distributed. A student with taste $y$ obtains payoff $1 + ay$ from attending school A, $1 - by$ from attending school B, and zero from attending school C, where $a = 48/7$ and $b = 6/7$. The majority of students have positive $y$ and prefer A (see Figure A1).

Each of the selective schools wants to enroll $K = 1/3$ of the students. School A places value $v + \alpha y$ on a student of type $(v, y)$, while B's value is $v - \alpha y$, where $\alpha = 1/3$. The schools aim to hit their enrollment targets while maximizing the average value of their enrolled students. In making admission decisions, school observe the ability $v$ of applicants, but not their taste $y$. Conversely, students known their own taste $y$ but not their $v$.

## 2. Regular Admissions Equilibrium

*Deriving the Equilibrium.* If there is no early admissions, students apply to both selective schools. School A admits all students with $v \geq A$. School B admits all students with $v \geq B$. The top students are admitted at both schools. Two-thirds of them choose A over B. To enroll 1/3 of the students, A must set a threshold $A = 1/2$. If B only admitted students with $v \geq 1/2$, its enrollment would be 1/6, so it must use a lower threshold. Setting $B = 1/3$ just fills its class (see Figure A2).

*Payoff of School A.* School A enrolls students with an average ability of 3/4 and an average $y$ of 1/3. It's payoff is therefore

$$\pi_A = \mathbb{E}_A \left[ v + \alpha y \right] = \frac{3}{4} + \alpha \frac{1}{3} = \frac{31}{36}. \tag{1}$$

*Payoff of School A.* School B enrolls some high-ability students also admitted to A, and some lower ability students. The groups are of equal size. The first group has average ability $3/4$ and average $y$ of $-1/6$. The second group has average ability $5/12$ and average $y$ of $1/6$. So B's payoff is:

$$\pi_B = \mathbb{E}_B\left[v - \alpha y\right] = \frac{1}{2}\left(\frac{3}{4} + \frac{5}{12}\right) + \alpha\frac{1}{2}\left(\frac{1}{6} - \frac{1}{6}\right) = \frac{7}{12}$$

*Payoff of the Students.* Students with $y < 0$ want to attend B and are admitted if $v \geq 1/3$. Students with $y > 0$ are accepted to A and enroll there if $v \geq 1/2$, and enroll at B if $v \in [1/3, 1/2)$. So the average payoff of a student with preference $y$ is

$$U\left(y\right) = \begin{cases} \frac{2}{3}\left(1 - by\right) & \text{if } y < 0 \\ \frac{1}{2}\left(1 + ay\right) + \frac{1}{6}\left(1 - by\right) & \text{if } y \geq 0 \end{cases}. \tag{2}$$

The average student payoff overall is

$$U = \int_{-1/3}^{2/3} U(y)dy = \frac{30}{21}.$$

## 3. Early Action Equilibrium

In a threshold equilibrium, students with $y \geq Y$ apply early to A, and the others apply early to B. The schools use thresholds $A_E < A_R$ and $B_E < B_R$ for early and regular admissions. We look equilibrium in which $Y > 0$, and A's thresholds are above B's. The unique such equilibrium is shown in Figure A3.

*Difference in Admission Cutoffs for A.* School A's early applicants have $y \geq Y$ and enroll if admitted. So if A admits an early applicant with ability $v$, its expected payoff is $v + \alpha\frac{1}{2}\left(Y + \frac{2}{3}\right)$. School A's regular applicants have $y < Y$ and are also applying early to B. If A admits a regular applicant with $v > B_E$, the student will enroll at A only if $y \geq 0$. The expected payoff from such a student is $v + \alpha\frac{1}{2}Y$. In equilibrium, A must be just indifferent between its marginal early applicant with $v = A_E$ and its marginal regular applicant with $v = A_R$. That is,

$$A_E + \frac{\alpha}{2}\left(Y + \frac{2}{3}\right) = A_R + \frac{\alpha}{2}Y. \tag{3}$$

2

This means that regardless of $Y$, we must have $A_R - A_E = 1/9$.

*Difference in Admission Cutoffs for B.* School B's early applicants have $y < Y$. So long as school B sets $B_E < A_R$, its marginal early admits (who have $v = B_E$) will all enroll. The expected payoff from these students is $B_E - \frac{\alpha}{2}\left(-\frac{1}{3} + Y\right)$. School B's regular applicants have $y \geq Y$. So long as $B_R < A_E$, it marginal regular admits (who have $v = B_R$) will also all enroll. The expected payoff from these students is $B_R - \frac{\alpha}{2}\left(Y + \frac{2}{3}\right)$. At equilibrium, B must be just indifferent between these two sets of students or else it would want to adjust its thresholds. It follows that $B_R - B_E = \frac{1}{6}$.

*Student Application Decisions.* We can tabulate the possible admissions outcomes for a student as follows:

|  | *Apply early to A* | *Apply early to B* |
|---|---|---|
| $v \geq A_R$ | A, B | A, B |
| $v \in [A_E, A_R]$ | A, B | B |
| $v \in [B_R, A_E]$ | B | B |
| $v \in [B_E, B_R]$ | Ø | B |
| $v < B_E$ | Ø | Ø |

Applying early to B means that if that if $v \in [B_E, B_R]$, the student can attend B rather than C. Applying early to A means that if $v \in [A_E, A_R]$, the student can attend A rather than B. If the student prefers B, it is best to apply early to B because — the extra option of enrolling at A is not valuable. For a student who prefers A (has $y > 0$), there is a trade-off. The expected benefit of applying early to A is $(A_R - A_E) \cdot (a + b) y$. The expected benefit of applying early to B is $(B_R - B_E) \cdot (1 - by)$. So applying early to A is optimal if:

$$\frac{(a + b) y}{1 - by} \geq \frac{B_R - B_E}{A_R - A_E} = \frac{3}{2}, \tag{4}$$

or equivalently if $y \geq Y = 1/6$.

*Finding the Admission Thresholds for A.* In equilibrium, school A enrolls all students who are admitted early (those with $y \geq 1/6$ and $v \geq A_E$), and also students who are admitted regular and have $y \geq 0$ (i.e. students with $y \in [0, 1/6)$ and $v \geq A_R$). The total quantity of these students must be $1/3$. So:

$$\frac{1}{2}(1 - A_E) - \frac{1}{6}(1 - A_R) = \frac{1}{3}. \tag{5}$$

3

Substituting for $A_R - A_E = 1/9$, we obtain $A_E = 17/36$ and $A_R = 7/12$.

*Finding the Admission Thresholds for B.* In equilibrium, school B enrolls students who are admitted early and choose B over A (those with $v \geq A_R$ and $y < 0$), students who are admitted early and are not admitted to A (those with $v \in [B_E, A_R)$ and $y < 1/6$), and students who are admitted regular and are not admitted at A (those with $v \in [B_R, A_E)$ and $y \geq 1/6$. Adding up the sizes of these groups must total $1/3$, so

$$\frac{2}{3}(1 - A_R) + \frac{1}{2}(A_R - B_E) + \frac{1}{2}(A_E - B_R) = \frac{1}{3}. \tag{6}$$

Substituting for $A_R, A_E$ and $B_R - B_E = 1/6$, we obtain $B_E = 1/4$ and $B_R = 5/12$.

*Payoff to School A.* School A enrolls two sets of students. The first group has abilities above $A_R = 7/12$, and $y$ values in the range $(0, 2/3)$. The second group has ability between $A_E = 17/36$ and $A_R = 7/12$, and $y$ values from $Y = 1/6$ to $2/3$. The first group contributes $5/18$ students. The second group contributes $1/18$ students. Therefore:

$$\pi_A = \mathbb{E}_A [v + \alpha y] = \frac{1}{1/3}\left[ \frac{5}{18}\left(\frac{19}{24} + \alpha\frac{1}{3}\right) + \frac{1}{18}\left(\frac{19}{36} + \alpha\frac{5}{12}\right)\right] = \frac{373}{432}$$

*Payoff to School B.* School B enrolls three sets of students. The first group has ability above $A_R = 7/12$ and $y < 0$, and includes $5/36$ students. The second group has ability between $B_E = 1/4$ and $A_R = 7/12$ and $y < 1/6$, and includes $1/6$ students. The third group has ability between $B_R = 5/12$ and $A_E = 17/36$ and $y \geq 1/6$ and includes $1/36$ students. Therefore

$$\pi_B = \mathbb{E}_B [v - \alpha y] = \frac{1}{1/3}\left[ \frac{5}{36}\left(\frac{19}{24} + \alpha\frac{1}{6}\right) + \frac{1}{6}\left(\frac{5}{12} + \alpha\frac{1}{12}\right) + \frac{1}{36}\left(\frac{4}{9} - \alpha\frac{5}{12}\right)\right] = \frac{173}{288}$$

Both schools have payoffs higher than in the regular admissions equilibrium.

*Payoff to Students.* The average payoff of a student with preference $y$ is:

$$U(y) = \begin{cases} (1 - B_E)(1 - by) & \text{if } y < 0 \\ (1 - A_R)(1 + ay) + (A_R - B_E)(1 - by) & \text{if } y \in [0, Y_{EA}) \\ (1 - A_E)(1 + ay) + (A_E - B_R)(1 - by) & \text{if } y \geq Y_{EA} \end{cases},$$

4

and the average overall payoff is:

$$U = \int_{-1/3}^{2/3} U(y)dy = \frac{229}{168}$$

So the average student payoff increases from approximately 1.02 to 1.36.

## 4. Early Decision Equilibrium

We now consider the case of early decision in which an early application commits a student to enroll if admitted. As discussed in the paper, A's early application policy becomes irrelevant in this case, so we can consider the case where B offers early decision and A has only regular admissions. The equilibrium, which we now derive, is shown in Figure A4.

*Student Decisions.* Suppose the schools use admission thresholds $B_E < B_R < A$. Applying early to B means that if $v \in [B_E, B_R]$, the student gets to attend B rather than C, but it also means that if $v \geq A$, the student loses the opportunity to attend A rather than B. If $y \leq 0$, it is better to apply to B. If $y > 0$, it is better to apply regular to both schools if:

$$(1 - A) \cdot (a + b) \, y \geq (B_R - B_E) \cdot (1 - by)$$

or equivalently if $y \geq Y$, where

$$Y = \frac{B_R - B_E}{(a + b)(1 - A) + b(B_R - B_E)}. \tag{7}$$

*School A's Admission Policy.* School A admits all students with $v \geq A$. Assuming that $A > B_E$, it enrolls only the admitted students who did not apply early to B (i.e. who have $y \geq Y$). In equilibrium it must enroll exactly 1/3 students, so

$$(1 - A)\left(\frac{2}{3} - Y\right) = \frac{1}{3}. \tag{8}$$

*School B's Admission Policy.* School B admits early applicants with $v \geq B_E$ and all of these students must enroll. School B also admits regular applicants with $v \geq B_R$. These student enroll only if they are rejected from A, i.e. if they have $v \in [B_R, A)$. In equilibrium,

B must enroll exactly 1/3 students, so

$$(1 - B_E)\left(\frac{1}{3} + Y\right) + (A - B_R)\left(\frac{2}{3} - Y\right) = \frac{1}{3}. \tag{9}$$

At the same time, B must also be just indifferent between its marginal early admit, who has ability $B_E$ and average taste $\frac{1}{2}\left(-\frac{1}{3} + Y\right)$, and its marginal regular admit, who has ability $B_R$ and average taste $\frac{1}{2}\left(Y + \frac{2}{3}\right)$. That is:

$$B_R - B_E = \alpha\frac{1}{2}\left[\left(Y - \frac{1}{3}\right) - \left(Y + \frac{2}{3}\right)\right] = \frac{1}{6}. \tag{10}$$

*Solving for the Equilibrium.* To solve for the equilibrium, note that we have four unknowns $Y, A, B_E, B_R$, and four equations (7), and (8)-(10). Solving these equations yields $Y \approx 0.039$, $A \approx 0.469$, $B_E \approx 0.229$, $B_R \approx 0.395$.

*Payoff to School A.* The payoff to school A is

$$\pi_A = \mathbb{E}_A\left[v + \alpha y\right] = \frac{1}{2}(1 + A) + \alpha\frac{1}{2}\left(Y + \frac{2}{3}\right) \approx 0.852$$

*Payoff to School B.* The payoff to school B is

$$\pi_B = \mathbb{E}_B\left[v - \alpha y\right] = \frac{1}{1/3}\left\{ \begin{array}{l} (1 - B_E)\left(Y + \frac{1}{3}\right)\left[\frac{1}{2}(1 + B_E) - \alpha\frac{1}{2}\left(Y - \frac{1}{3}\right)\right] \\ + (A - B_R)\left(\frac{2}{3} - Y\right)\left[\frac{1}{2}(A + B_R) - \alpha\frac{1}{2}\left(\frac{2}{3} + Y\right)\right] \end{array} \right\} \approx 0.615$$

*Payoff to the Students.* The expected payoff for a student with preference $y$ is:

$$U(y) = \left\{ \begin{array}{ll} (1 - B_E)(1 - by) & \text{if } y < Y \\ (1 - A)(1 + ay) + (A - B_R)(1 - by) & \text{if } y \geq Y \end{array} \right. .$$

The average student payoff overall is:

$$U = \int_{-1/3}^{2/3} U(y)dy \approx 1.495$$

## 5. Early Action with Informed Students

We now consider the case where students observe an initial signal about their ability equal to either $g$ or $b$. Half the students observe a $g$ and half a $b$. Students who observe $g$ have abilities distributed on $[0,1]$ with density $2x$. Student who observe $b$ have abilities distributed on $[0,1]$ with density $2(1-x)$. So the population distribution of ability is still uniform, but students with a $g$ signal are on average higher ability. The conditional ability distributions are shown in Figure A5. As noted in the paper, this information has no effect on the regular admissions outcome. The early action equilibrium, which we now derive, is depicted in Figure A6.

*Student Decisions.* Let's start with the student problem. Assume the schools use thresholds $A_E < A_R$ and $B_E < B_R$, with $A_E \leq B_E$. Just as above, applying early to B benefits the student if $v \in [B_E, B_R)$, and applying early to A benefits the student if $v \in [A_E, A_R)$. Students with $y \leq 0$ prefer to apply early to B — this maximizes the odds of admission to B and the chance of admission to either A or B. As above, students with $y > 0$ have a trade-off. The expected benefit of applying early to A is $\Pr(A_E \leq v < A_R) \cdot (a+b)y$. The expected benefit of applying early to B is $\Pr(B_E \leq v < B_R) \cdot (1 - by)$. So it is optimal to apply early to A if

$$\frac{(a+b)y}{1-by} \geq \frac{\Pr(B_E \leq v \leq B_R)}{\Pr(A_E \leq v \leq A_R)}. \tag{11}$$

The left hand side is increasing in $y$, so students with higher $y$ will apply to A. The difference with before is that the relative likelihood of having ability in the interval $[A_E, A_R)$ versus $[B_E, B_R)$ depends on whether the student has a $g$ or $b$ signal. For students with a $g$ signal, $\Pr(L \leq v \leq H|g) = (H-L)(H+L)$. For students with a $b$ signal, $\Pr(L \leq v \leq H|b) = (H-L)(2-(H+L))$. So students with a $g$ signal will apply early to A if $y \geq Y_g$, where

$$Y_g = \frac{(B_R - B_E)(B_R + B_E)}{\frac{54}{7}(A_R - A_E)(A_R + A_E) + \frac{6}{7}(B_R - B_E)(B_R + B_E)} \tag{12}$$

and students with a $b$ signal will apply early to A if $y \geq Y_b$, where

$$Y_b = \frac{(B_R - B_E)(2 - B_R - B_E)}{\frac{54}{7}(A_R - A_E)(2 - A_R - A_E) + \frac{6}{7}(B_R - B_E)(2 - B_R - B_E)} \tag{13}$$

*School A's Admission Policy.* School A admits early applicants with $v \geq A_E$ and all these students enroll. It also admits regular applicants with $v \geq A_R$, and assuming $A_R > B_E$, these

7

students will enroll if $y \geq 0$. Its total enrollment must equal $1/3$ in equilibrium. Therefore

$$\frac{1}{2}\left[(1 - A_R)Y_b + (1 - A_E)\left(\frac{2}{3} - Y_b\right)\right] \tag{14}$$
$$+ \frac{1}{2}\left[(1 - A_R)Y_g + (1 - A_E)\left(\frac{2}{3} - Y_g\right)\right] = \frac{1}{3}$$

Letting $\overline{Y} = \frac{1}{2}(Y_g + Y_b)$ and re-arranging:

$$(1 - A_R)\overline{Y} + (1 - A_E)\left(\frac{2}{3} - \overline{Y}\right) = \frac{1}{3}. \tag{15}$$

$$\frac{1}{2} - (A_R - A_E)\overline{Y}\frac{3}{2} = A_E \tag{16}$$

In addition, school A must be just indifferent between its marginal early admit (with $v = A_E$) and its marginal regular admit (with $v = A_R$). All the marginal early admits will enroll, and their average taste is either $\frac{1}{2}\left(Y_g + \frac{2}{3}\right)$ or $\frac{1}{2}\left(Y_b + \frac{2}{3}\right)$ depending on whether they are $g$ or $b$ students. The marginal regular admits will enroll only they prefer A, and their average taste is either $\frac{1}{2}Y_g$ or $\frac{1}{2}Y_b$. It follows that:

$$A_R + \alpha\left(\frac{Y_g}{Y_g + Y_b}\frac{1}{2}Y_g + \frac{Y_b}{Y_g + Y_b}\frac{1}{2}Y_b\right) \tag{17}$$
$$= A_E + \alpha\left(\frac{\frac{2}{3} - Y_g}{\frac{2}{3} - Y_g + \frac{2}{3} - Y_b}\frac{1}{2}\left(Y_g + \frac{2}{3}\right) + \frac{\frac{2}{3} - Y_b}{\frac{2}{3} - Y_g + \frac{2}{3} - Y_b}\frac{1}{2}\left(Y_b + \frac{2}{3}\right)\right)$$

Simplifying and re-arranging, we obtain

$$A_R - A_E = \frac{1}{6}\left(\frac{\frac{4}{9} - \frac{1}{2}\left(Y_g^2 + Y_b^2\right)}{\frac{2}{3} - \overline{Y}} - \frac{\frac{1}{2}\left(Y_g^2 + Y_b^2\right)}{\overline{Y}}\right) \tag{18}$$

*School B's Admission Policy.* School B admits early applicants with $v \geq B_E$. Of these students, the ones with $v \geq A_R$ only enroll at B if $y < 0$, while the ones with $v \in [B_E, A_R)$ all enroll at B. School B also admits regular applicants with $v \geq B_R$. Of these students, only the ones with $v < A_E$ enroll. In equilibrium, B's total enrollment must be $1/3$, so

$$(1 - A_R)\frac{1}{3} + (A_R - B_E)\left(\frac{1}{3} + \overline{Y}\right) + (A_E - B_R)\left(\frac{2}{3} - \overline{Y}\right) = \frac{1}{3}. \tag{19}$$

In addition, school B must also be indifferent between marginal early and regular admits,

all of whom will enroll assuming that $B_E < A_R$ and $B_R < A_E$. Computing the average taste of the marginal students as we did for school A, we obtain the indifference condition:

$$B_E - \alpha \left( \frac{\frac{1}{3} + Y_b}{\frac{1}{3} + Y_b + \frac{1}{3} + Y_g} \frac{1}{2} \left( -\frac{1}{3} + Y_b \right) + \frac{\frac{1}{3} + Y_g}{\frac{1}{3} + Y_b + \frac{1}{3} + Y_g} \frac{1}{2} \left( -\frac{1}{3} + Y_g \right) \right) \quad (20)$$

$$= B_R - \alpha \left( \frac{\frac{2}{3} - Y_b}{\frac{2}{3} - Y_b + \frac{2}{3} - Y_g} \frac{1}{2} \left( Y_b + \frac{2}{3} \right) + \frac{\frac{2}{3} - Y_g}{\frac{2}{3} - Y_b + \frac{2}{3} - Y_g} \frac{1}{2} \left( Y_g + \frac{2}{3} \right) \right)$$

which can again be simplified so that:

$$B_R - B_E = \frac{1}{6} \left( \frac{\frac{4}{9} - \frac{1}{2} \left( Y_b^2 + Y_g^2 \right)}{\frac{2}{3} - \overline{Y}} - \frac{\frac{1}{2} \left( Y_b^2 + Y_g^2 \right) - \frac{1}{9}}{\overline{Y} + \frac{1}{3}} \right) \quad (21)$$

*Solving for the Equilibrium.* This gives us six equilibrium conditions, and six unknowns $Y_b, Y_g, A_E, A_R, B_E, B_R$. Solving these equations numerically, we find that the new equilibrium involves students with a $g$ signal applying early to A if $y \geq Y_g \approx 0.114$, while students with $b$ signals only apply early to A if $y \geq Y_b \approx 0.226$. So the new feature of the equilibrium is that students with good test scores (i.e. a $g$ signal) are more likely to apply early to A because they assign relatively high probability to having abilities in the range $[A_E, A_R]$ compared to $[B_E, B_R]$. For the specific parameters we've chosen, the equilibrium admission thresholds are: $A_E \approx 0.473$, $A_R \approx 0.580$, $B_E \approx 0.252$, and $B_R \approx 0.416$.

*Payoff to School A.* The payoffs to the school A can be computed in similar fashion to the above section.

$$\pi_A = \mathbb{E}_A \left[ v + \alpha y \right]$$
$$= \frac{1}{1/3} \left\{ \begin{array}{c} (1 - A_E) \left( \frac{2}{3} - \overline{Y} \right) \mathbb{E}_A \left[ v + \alpha y \right| \text{ early} ] \\ + (1 - A_R) \overline{Y} \mathbb{E}_A \left[ v + \alpha y \right| \text{ regular} ] \end{array} \right\} \approx 0.921$$

*Payoff to School B.* Similarly, the payoff to school B is:

$$\pi_B = \mathbb{E}_B \left[ v - \alpha y \right]$$
$$= \frac{1}{1/3} \left\{ \begin{array}{c} (1 - A_R) \frac{1}{3} \mathbb{E}_B \left[ v - \alpha y \right| \text{ early } \& \ v \geq A_R ] \\ + (A_R - B_E) \left( \frac{1}{3} + \overline{Y} \right) \mathbb{E}_B \left[ v + \alpha y \right| \text{ early } \& \ v < A_R ] \\ + (A_E - B_R) \left( \frac{2}{3} - \overline{Y} \right) \mathbb{E}_B \left[ v + \alpha y \right| \text{ regular} ] \end{array} \right\} \approx 0.600.$$

9

*Payoff to Students.* For the students, we have

$$
U(y, w) = \begin{cases}
\Pr(v \geq B_E|w)(1 - by) & \text{if } y < 0 \\
\Pr(v \geq A_R|w)(1 + ay) + \Pr(v \in [B_E, A_R]|w)(1 - by) & \text{if } y \in [0, Y_w) \\
\Pr(v \geq A_E|w)(1 + ay) + \Pr(v \in [B_R, A_E]|w)(1 - by) & \text{if } y \geq Y_w
\end{cases} ,
$$

where $w \in \{g, b\}$ is the student's signal. The average payoff for $g$ and $b$ students is:

$$
\begin{aligned}
U(g) &= \int_{-1/3}^{2/3} U(y, w)\, dy = 1.998 \\
U(b) &= \int_{-1/3}^{2/3} U(y, w)\, dy = 0.706
\end{aligned}
$$

and the average overall payoff is $U = 1.387$

## 6. Discussion

We briefly summarize some of the key points from the example.

1. In equilibrium, an early application signals student interest. Students who apply early to a selective school have a stronger preference for that school than regular applicants. The schools use this information and favor their early applicants.

2. Students have an incentive to be strategic and do not always apply early to their preferred school. In equilibrium, students only apply early to A if they are sufficiently enthusiastic because an early application to A carries an increased risk of missing out on *both A and B*.

3. When students are partially informed, students who are more optimistic about their chances are more likely to apply early to A. As a result, A's early pool is stronger in terms of ability than its regular pool, and the reverse is true of school B. This matches the empirical findings in Section I of the paper.

4. In equilibrium, some students may experience regret. A student who strategically applied early to B (i.e. with $y \in (0, Y)$) may regret not taking the chance on A if it turns out that an early application to A would have made the difference (i.e. if

10

$v \in [A_E, A_R)$), while some students who applied early to A and were rejected may regret not applying early to B if it turns out that $v \in [B_E, B_R)$.

5. Both schools are better off with early admissions. The paper shows that this is a general property of early action (it benefits both school relative to regular admissions), and that early decision benefits school B but does not always improve the payoff of school A.

6. The welfare consequences for more ambiguous. While some students are ex post worse off in an early action equilibrium, in this example the students do benefit on average from both early action and early decision. The paper shows that students always benefit on average from early action so long as the student payoff to attending A is increasing in $y$ and the payoff to attending B is decreasing in $y$.
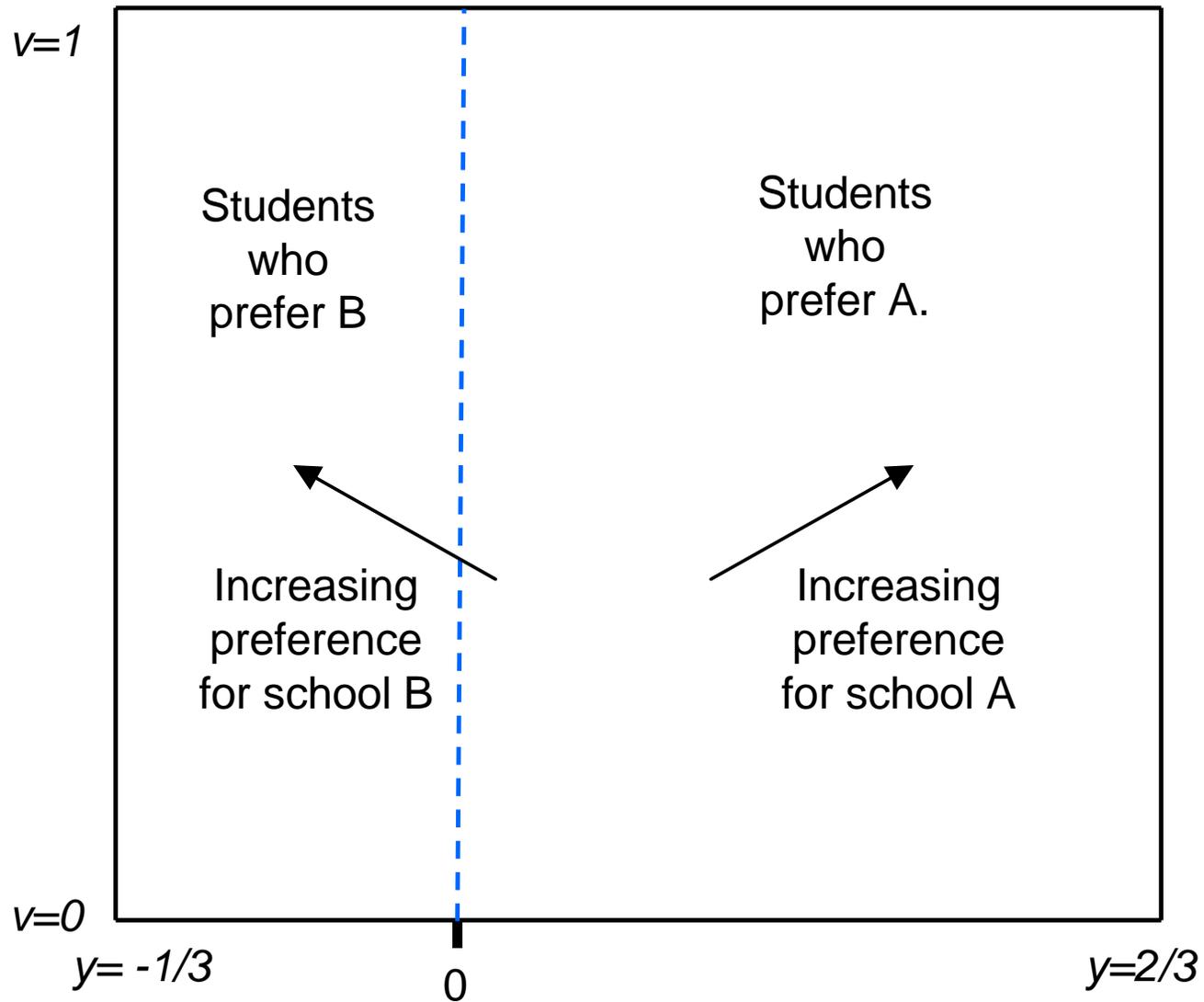
Figure A1: Student and School Preferences

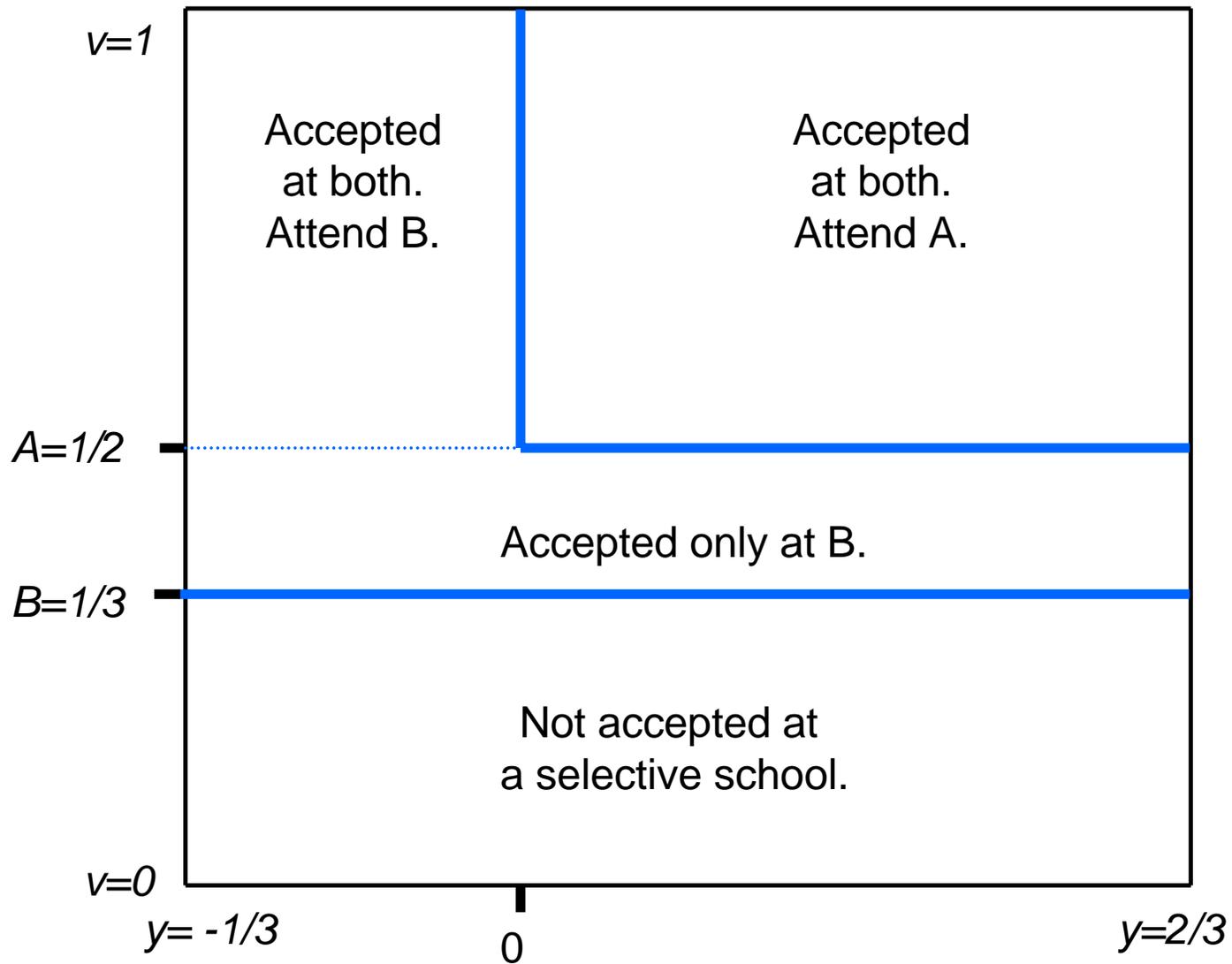Figure A2: Regular Admissions Equilibrium

# Figure A3: Early Action Equilibrium



v=1

Accepted early at B. Attend A.

Accepted early at B. Attend B.

Accepted early at A. Attend A.

$A_R$

1/2

$A_E$

Accepted regular at B.

$B_R$

1/3

$B_E$

Not accepted at a selective school.

*Apply early to B*          *Apply early to A*

v=0

y= -1/3

0          1/6

y=2/3
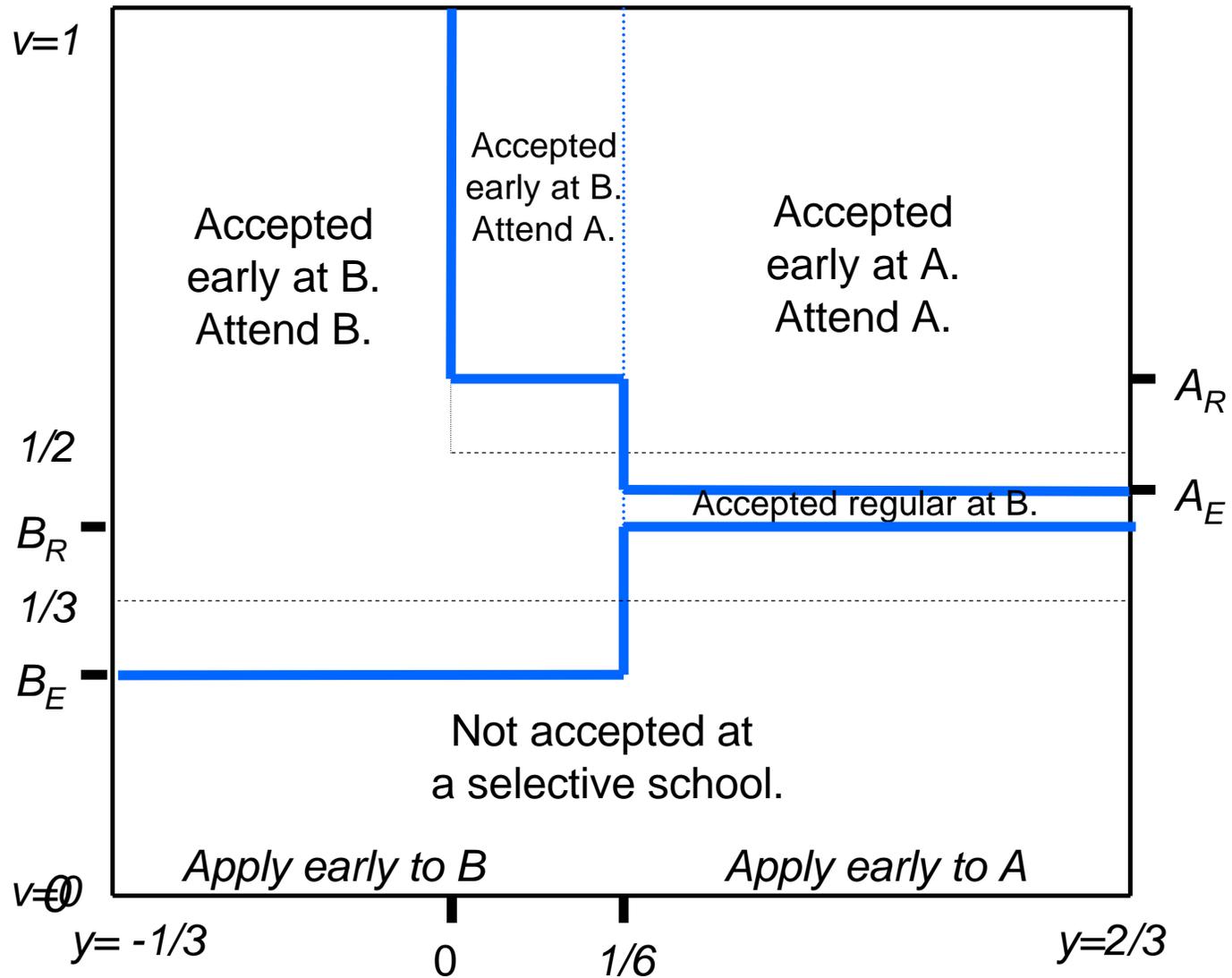
# Figure A4: Early Decision Equilibrium



*v=1*

Accepted
early at B.
Attend B.

Accepted
regular at A.
Attend A.

*1/2*

$B_R$

Accepted regular at B.

*A*

*1/3*

$B_E$

Not accepted at
a selective school.

*Apply early to B*

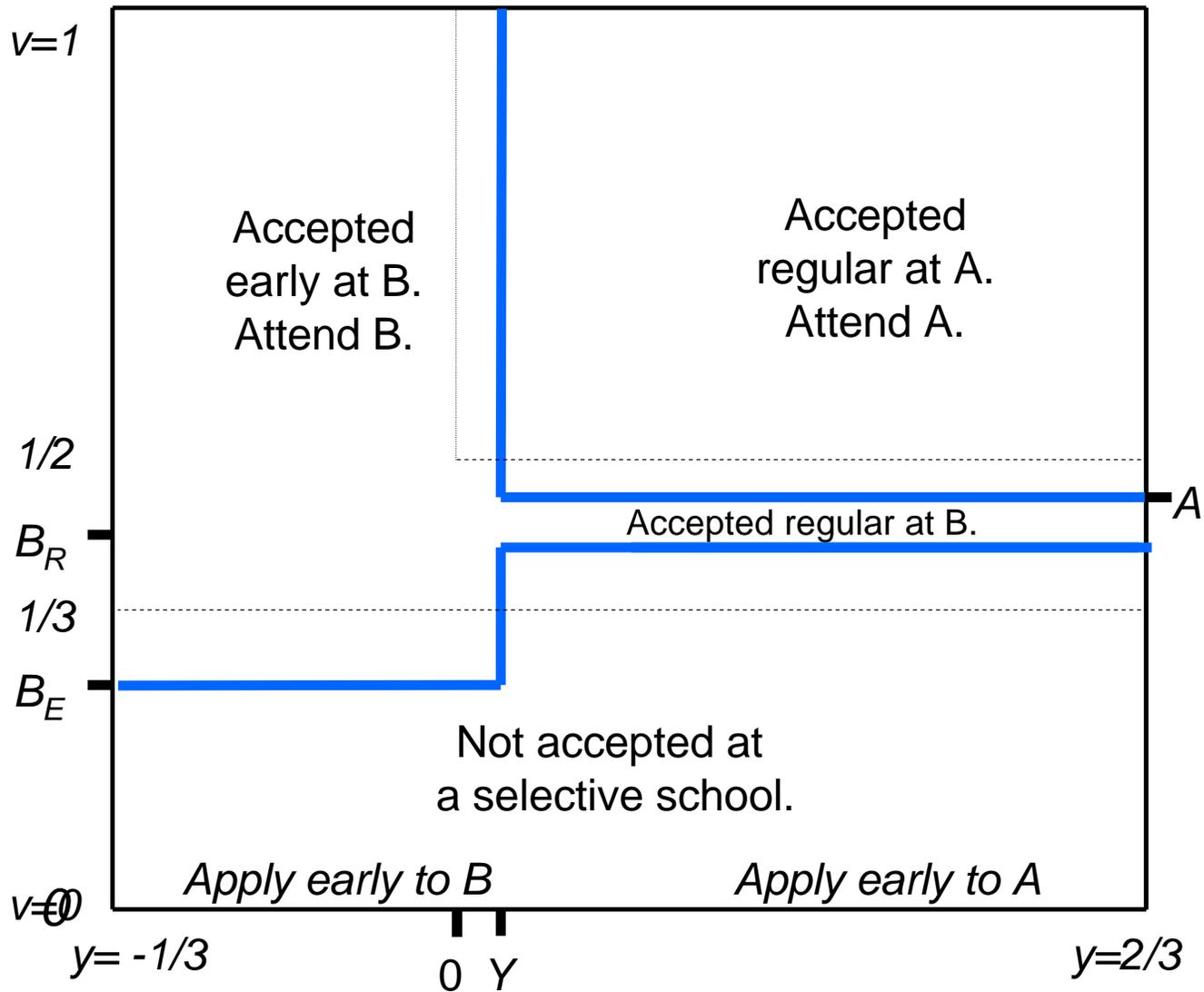*Apply early to A*
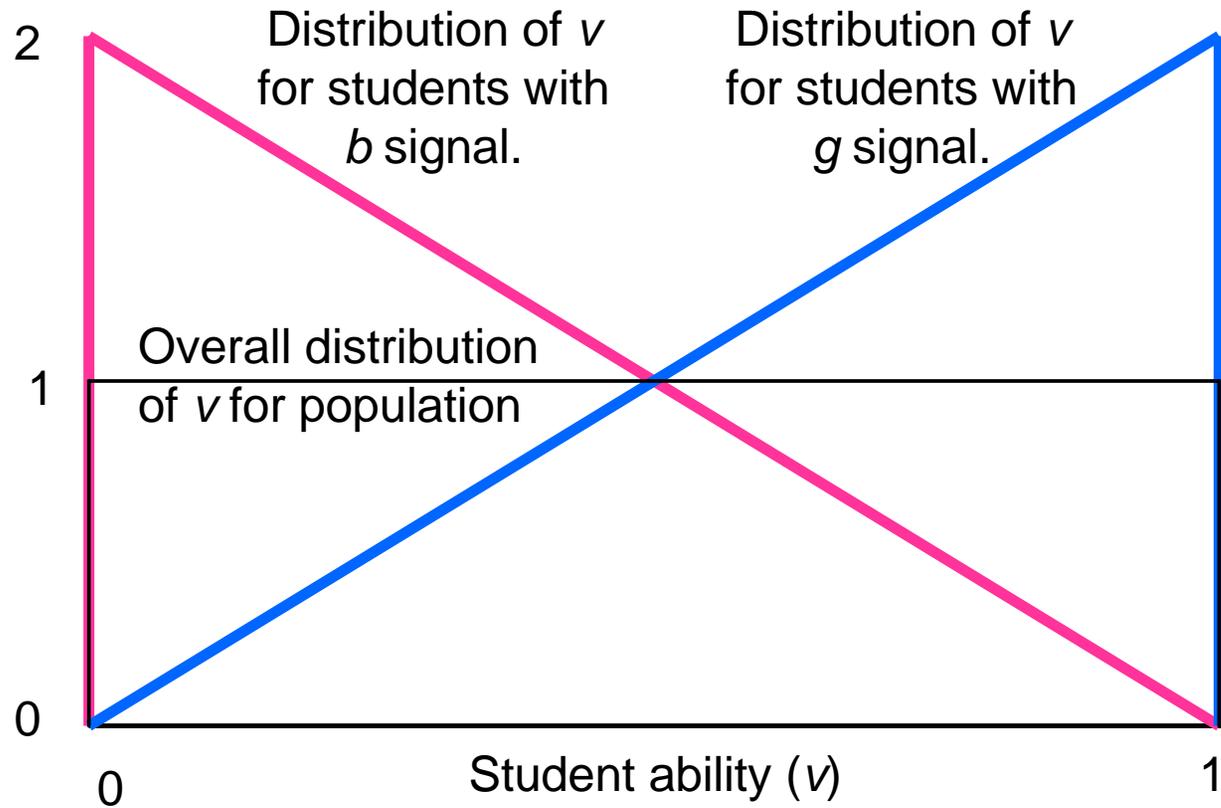
*v=0*

*y= -1/3*

*0  Y*

*y=2/3*

Figure A5: Student Information

# Figure A6: Early Action with Informed Students



Accepted early at B. Attend B.

Accepted early at A or B. Attend A.

Accepted early at A. Attend A.

$A_R$

Region 1

$1/2$

$A_E$

Accepted at B. Attend B.

$B_R$

$1/3$

Region 2

$B_E$

Not accepted at a selective school.

$v=1$

$v=0$

*Apply early to B*

*Apply early to A if q*

*Apply early to A*

$y= -1/3$

$0$

$0.114$  $0.226$

$y=2/3$