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Frictional matching: Evidence from law school admission

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ABSTRACT

We measure friction as the number of unnecessary student applications and school admissions that have to be undertaken per actual matriculation. Friction increases with student and school attractiveness with a decrease at the top.

1. Introduction

Undergraduate students and law schools spend substantial resources to match. In 2003, the 184 law schools approved by the American Bar Association (ABA) received 533,000 applications, 75% of which were rejected. Subsequently, students turned down 65% of the schools' offers. The associated costs mount quickly. Students have to study each school they apply to, pay an application fee, and often spend time writing a school specific statement. Schools have to finance admissions offices.

In a frictionless world, as in Becker's model of assortative matching (1973), each matriculation requires just one application and one admissions procedure. In the presence of friction, however, both students and schools need to invest to match. The literature has considered several types of market imperfections. Nagypal (2004) assumes students have imperfect information on their own type. They apply to schools based on exogenous schools' admission rules. Chade et al. (2009) assume instead that schools do not perfectly observe student quality. We measure friction as the number of unnecessary student applications and school admissions that are undertaken during the admission process. We document how frictions depend on the attractiveness of the market participants and discuss the implications for models of frictional matching.

2. Law school admission and data

Students apply to law schools through a centralized institution. Schools then make admission decisions and, finally, students choose where to matriculate. The Law School Admission Test (LSAT) is a standardized test which is required by all ABA approved law schools. We use the LSAT score as our measure of student attractiveness.[1] Law Schools are also heterogeneous. Following the literature, we use the U. S. News Score (USNS), which aggregates 12 measures of quality, as a measure of school attractiveness.[2] The USNS is an integer between 20 and 100. Bottom schools are clustered in two groups and assigned a score equal to 20 or 30. Although imperfect and controversial, the USNS remains extremely popular amongst potential candidates, employers, and the general public (Posner, 2006).

Our sample includes the 184 law schools approved by the ABA in 2003. Table 1 reports the total number of applications, admissions and matriculations. Due to missing information, figures disaggregated by school type are based on 175 schools and figures disaggregated by student type are based on 119 schools. This is unlikely to affect the results, as there is no systematic correlation between USNS and the amount of information reported in the Official Guide to ABA Approved Law Schools.

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[1] LSAT scores range between 120 and 180. Students with LSAT scores below 140 are included in one category and assigned a value of 137.5. These are students with little chance of being admitted to any school (less than one application in 100 is successful).

[2] The USNS is used to compute the USNS ranking, which we do not use in this paper.

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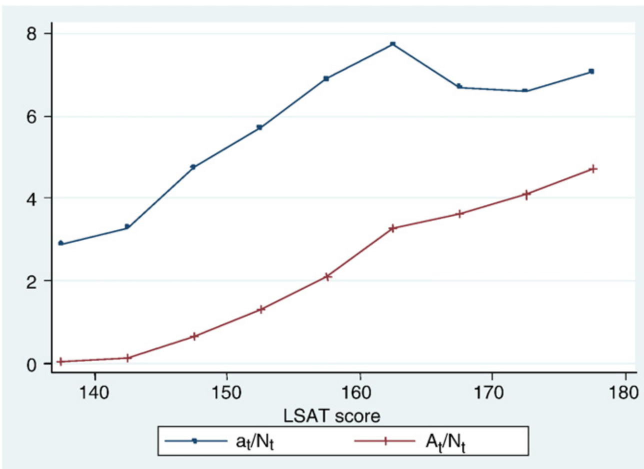
Table 1
Summary statistics.

	(1)	(2)	(3)
	Number of procedures (/1000)	Friction (number of procedures per matriculation)	Friction (number of procedures per applicant)
Applications	533	11.17	5.30
Admissions	136	2.85	1.35
Matriculations	47	1	0.47

Column 3 is based on 100,000 applicants.



Note: The figure is based on 324,000 applications, 83,000 admissions, and 61,000 applicants in 119 schools.

Fig. 1. Application friction (a_t/N_t) and admission friction (A_t/N_t) by student type t.

3. Evidence

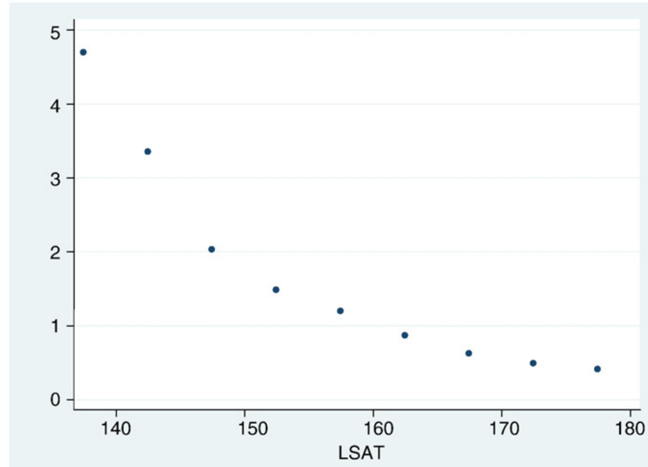
Denote student LSAT score by $t \in T = [140,180]$ and school rank by $s \in S = [20,\ldots,100]$. For type y $\{S \cup T\}$, a_y denotes the number of applications, A_y the number of admissions, M_y the number of matriculated students, and N_y the number of applicants. The same variables without sub-indexes refer to the total population. Application friction, $F_a = a/M$, measures excess applications per matriculation. Admission friction, $F_A = A/M$, measures excess admissions per matriculation. Table 1, column 2 reports that $F_a = 11.17$ and $F_A = 2.85$. Due to data limitations, we will sometimes use measures of friction based on the number applicants instead of matriculants, $F_a = a/N$ and $F_A = A/N$.[3] Table 1, column 3 reports that $F_a = 5.3$ and $F_A = 1.35$.

$F_{x,y}$ denotes friction $x \in \{a,A\}$ for participant of type $y \in \{S \cup T\}$. Our two measures of friction are related by

$$F_{a,y} = \frac{a_y}{A_y} F_{A,y}$$

where a_y/A_y is a measure of school selectivity (the inverse of the admission probability). In a frictionless world, we have $F_{x,y} = 1$ for all x and y. Our aim is to document how these two measures of friction depend on student and school type.

[3] We do not observe matriculation by student type. Therefore, we decompose our measures of friction by student type by normalizing by the number of applicants, as in Table 1, column 3. We compute the total number of applicants by dividing the total number of applications by the average number of applications per applicant. To compute the number of applicants by student type, we assume that the distribution of applicants is the same as the distribution of LSAT scores (in the 2000–2003 period).



Note: The figure is based on 119 schools.

Fig. 2. The number of applications per admission a_t/A_t by student type t (log scale).

3.1. Students

Fig. 1 reports $F_{a,t}$ as a function of student type. Better students apply to more schools, with a slight decrease for top students. Students with the top LSAT scores apply to about 3 times more schools than students with the lowest scores. Fig. 1 also plots $F_{A,t}$. Better students secure more admissions per capita. The number of admissions per student triples as one moves from the bottom to the top students.

Better students are more likely to be admitted (Fig. 2). About one application in 100 is successful for the weakest students. Top students need less than 2 applications to secure an admission. Interestingly, better students do not compensate for this increase in the likelihood of admission by applying to fewer schools. Instead, application friction $F_{a,t}$ increases with t and only starts to slightly decrease for very top students.

3.2. Schools

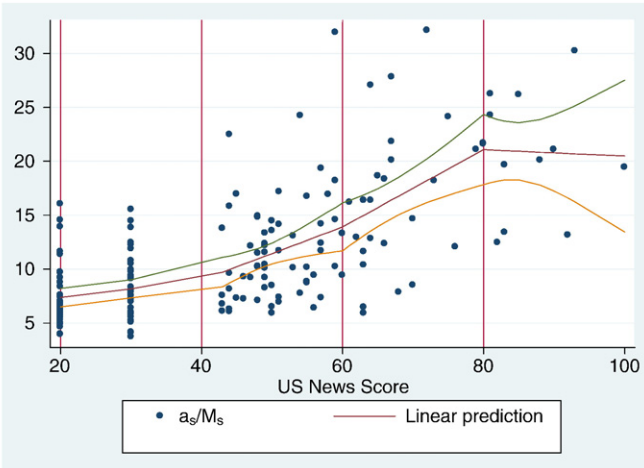
Better schools have higher application friction ($F_{a,s}$ increases with s in Fig. 3). Top schools receive about 3 times more applications than bottom ones. Fig. 4 shows that admission friction $F_{A,s}$ slightly increases for better schools, and sharply falls for the top schools. Better schools are more selective (higher a_s/A_s), with a pronounced increase for top schools (Fig. 5).[4] The small initial increase in admission friction is due to the fact that school selectivity (a_s/A_s) partially compensates for the increase in application friction. For top schools, however, selectivity sharply increases and application friction remains constant, two effects that contribute to the drop in admission friction.

Table 2 shows that the results are robust when we explain friction with dummies for different intervals of school type using OLS regression (instead of the spline regressions presented in Figs. 3–4) and also when we control for class size. (A new result from Table 2 is that small schools generate less friction.)

3.3. Summary

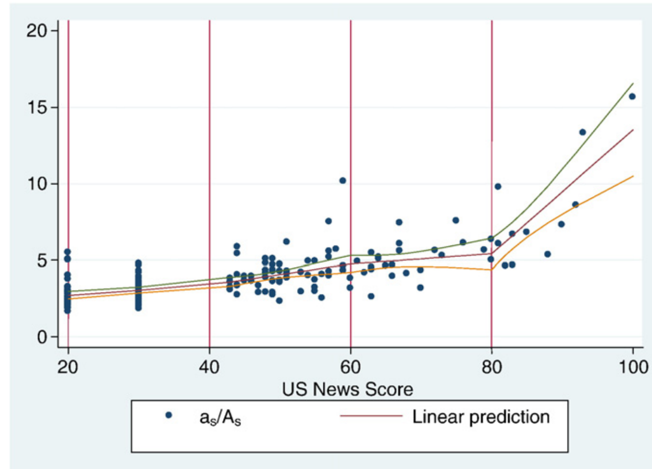
Application friction F_a, is increasing and concave in both school and student type, with a slight decrease for very top students. Admission friction F_A increases with student type and slowly increases with school type, but then sharply falls for top schools. The initial increase in friction (F_a,or F_A,) is more pronounced for students than for schools,

[4] School selectivity is one of the twelve variables used to construct the USNS index, but this is unlikely to explain the relation in Fig. 5, because its weight is only 2.5%.



Note: The figure is based on 175 schools. The figure reports the predicted values of a linear spline regression and the 95 percent confidence interval.

Fig. 3. Application friction (a_s/M_s) by school type s.



Note: See Figure 3.

Fig. 5. School selectivity (a_s/A_s) by school type s.

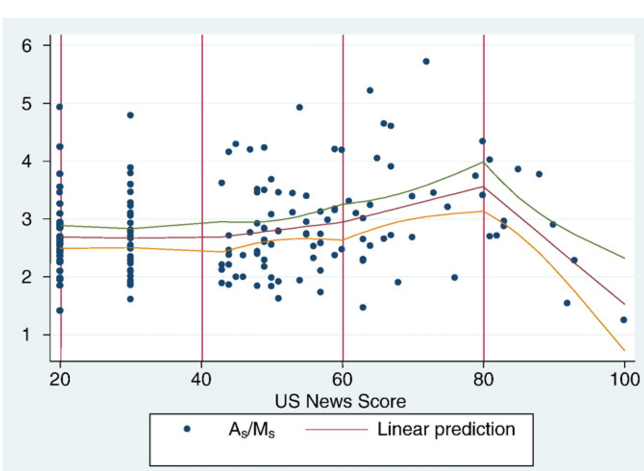
and the decrease in admission friction F_A, is more pronounced for top schools than for top students.

4. Discussion

The evidence that $F_{x,y} \neq 1$ is inconsistent with the frictionless view of the world. The frictional matching literature has considered several types of market imperfection. Shimer and Smith (2000) propose a search model with vertically differentiated types, and present equilibria where the matching sets are convex and increasing with type. High types would like to match with equals, but there is a waiting cost, so they end up accepting types inferior to them. Higher types search less; a prediction that is inconsistent with the evidence. In the search framework, however, types have no control over whom they meet; an assumption that is unrealistic here.

Chade et al. (2009) assume that applications are costly. This is consistent with the observation that students apply only to a small subset of schools. In addition, schools have an imperfect indication on student type. An interpretation in our application is that the LSAT is an imperfect signal of some underlying true type. The paper derives properties of the sorting equilibrium in the two-school case. The worst students apply to no school because it is not worth the cost, better students apply to the bottom school only, even better students apply to both schools, gambling for a top acceptance, the next tier also applies to both schools to ensure acceptance, and top students apply only to the top school to save money. A more realistic model with more than 2 schools remains beyond current reach. We conjecture that the predictions of the 2-school model apply to the bottom and top schools in our sample, leaving the threshold between these two tiers undetermined. This is a crude attempt at bridging the theory and the evidence but it is the best that can be done at the moment.

Evidence is consistent with the model. (a) Application friction increases with student type and decreases for top students, which is consistent with the prediction that only mid-range students apply to both schools. (b) Admission friction decreases for top schools, which is consistent with the prediction that top schools are less likely to be



Note: See Figure 3.

Fig. 4. Admission friction (A_s/M_s) by school type s.

Table 2
The impact of school type and class size on friction (OLS).

	(1) a_s/M_s	(2) a_s/M_s	(3) A_s/M_s	(4) A_s/M_s
USNS = 30	0.999	1.491*	0.055	0.173
	(0.684)	(0.789)	(0.153)	(0.162)
40 < USNS ≤ 60	4.340***	4.347***	0.117	0.140
	(0.767)	(0.779)	(0.141)	(0.143)
60 < USNS ≤ 80	9.508***	9.571***	0.607***	0.609***
	(1.395)	(1.424)	(0.226)	(0.224)
80 < USNS	7.419***	7.704***	0.069	0.152
	(1.846)	(1.848)	(0.195)	(0.198)
100 < class size < 200		2.989*		0.257
		(1.570)		(0.180)
200 < class size ≤ 300		2.823*		0.464**
		(1.593)		(0.194)
300 < class size ≤ 400		3.177*		0.582***
		(1.623)		(0.205)
400 < class size		2.888*		0.433*
		(1.713)		(0.229)
Constant	7.292***	4.334***	2.673***	2.243***
	(0.452)	(1.551)	(0.103)	(0.198)
Observations	184	184	184	184
R-squared	0.31	0.32	0.06	0.09
(40 < USNS ≤ 60) = (60 < USNS ≤ 80)	0.00	0.00	0.03	0.04
(60 < USNS ≤ 80) = (80 < USNS)	0.35	0.40	0.04	0.08

Robust standard errors in parentheses. The table reports the p-values of the F-tests of the equality of coefficients.

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

rejected. Some questions remain unanswered, however. Why do top students have to secure so many admissions? Why does application and admission friction increase over such a large range of schools and decrease only at the very top?

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