

University Choice: The Role of Expected Earnings, Non-pecuniary Outcomes and Financial Constraints*

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Abstract

This paper investigates the determinants of the type of higher education chosen by students. We focus on the role of expected monetary returns, non-pecuniary factors enjoyed at school, and financial constraints. For this purpose, we combine rich individual-specific data – collected from students in urban Pakistan – on (i) subjective expectations about labor market outcomes, (ii) subjective expectations about non-pecuniary outcomes, (iii) choice set respecting each student’s budget constraint, and (iii) stated school choice both with and without financial constraints. Estimates from the model, using choice (and choice set) under financial constraints, show that future earnings are significant determinants of university choice, but their effect is rather small. However, non-pecuniary school-specific factors – such as parents’ approval and school’s ideology – are major determinants of the choice. Data on students’ choices without financial constraints allows for the out-of-sample validation of the model, which shows strikingly good fit. We use our estimated model to simulate the effects of several policies, including providing access to student loans. We find that functioning credit markets would increase students’ average lifetime utility by 21% and cause 37% of the students to switch university, indicative of financial constraints playing a major role in university choice in this setting.

JEL Codes: D81; D84; I21; I23.

Keywords: school choice; credit constraints; subjective expectations.

*We would like to thank Elizabeth Brown, Maricar Mabutas and, in particular, Victoria Gregory for outstanding research assistance. We are enormously indebted to our local field teams and participating institutions for without their assistance this project would not have reached its conclusion. Funding through a RAND Independent Research and Development grant is gratefully acknowledged. Any errors that remain are ours. The views expressed in this paper do not necessarily reflect those of the Federal Reserve Bank of New York or the Federal Reserve System as a whole.

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1 Introduction

The accumulation of human capital is central to most development paradigms. While the focus has been primarily on primary education, there has been a recent interest in tertiary education. Tertiary education is judged important for participation and competitiveness in the knowledge economy, and to build the human capital – the doctors, engineers, lawyers, teachers - that in turn creates the institutions believed to be indispensable for development (Task Force on Higher Education and Society, 2000, Kapur and Crowley, 2008). While they still lag far behind those of developed countries, enrollments in higher education in developing countries have increased dramatically in the past decades (reaching 7% in 2007), such that half the world’s higher education students today live in a developing country (Altbach et al., 2009, Task Force on Higher Education and Society, 2000).

Public higher education systems in the developing world are characterized by poor quality (in part due to scarcity of resources) and the inability to cope with the increased demand stemming from demographic pressures created by a very young population. As a result, a vibrant private sector has emerged to fill in the void. The private sector now educates more than half of the student population in countries such as Mexico, Brazil, Indonesia, and the Philippines (Altbach et al., 2009). The creation of new universities by religious organizations is a particularly important phenomenon (Task Force on Higher Education and Society, 2000). Within a country, students therefore have various options of university types available to them, of varying quality and cost. In this paper, we estimate a life-cycle utility model of school choice to investigate the determinants of the type of higher education chosen by students in urban Pakistan. We focus on the role of expected monetary returns, non-pecuniary factors enjoyed at school, and financial constraints.

Understanding the relative role of expected monetary returns, non-pecuniary factors and financial constraints in school choice is challenging with the type of data on school attendance and family background typically available from surveys. The reason for this challenge is a threefold identification issue. First, expectations about future earnings are usually not observed. Without those, the standard approach has been to make assumptions on expectations (e.g., that they are equal to realized earnings). Making inference on the decision-making process based on choice data and those maintained assumptions on expectations is problematic since (i) subjective expectations may be very different from the ones assumed and (ii) observed choices might be consistent with several combinations of expectations and preferences (e.g., Manski, 1993, 2004). Second, students’ expectations about non-pecuniary outcomes enjoyed while at school are also typically not observed, and as a result rarely taken into consideration directly. However, they are found to be instrumental when directly taken into consideration (e.g., Zafar, 2013). Finally, making inference on the importance of the role of financial constraints in school choice is difficult because typically available data do not provide a direct way of identifying which students are credit constrained (Cameron and Taber, 2004). The resulting approaches are therefore usually

indirect (e.g., by looking at differentials in schooling decision by family income and wealth), and dependent on modeling assumptions (Lochner and Monge-Naranjo, 2012).¹

In this paper, we use new data on (i) subjective expectations about labor market outcomes, (ii) subjective expectations about non-pecuniary outcomes, (iii) individual-specific choice set respecting each student’s budget constraint, and (iii) stated school choice with and without financial constraints to circumvent those identification issues and estimate a life-cycle utility model of school choice. We survey male students of college-going age in two urban centers in Pakistan, who are currently enrolled in a college and pursuing a bachelors-equivalent degree. Students are provided with a hypothetical scenario of school choice, and asked to rank five different existing universities in terms of their preference of enrolling in them (assuming guaranteed admissions), conditional on their current financial status as well as conditional on no costs. We refer to the school chosen in the scenario under their current financial status as the “constrained choice”, and the one chosen under the scenario of no costs as “unconstrained choice”. We also elicit students’ subjective beliefs about future earnings, the chance of graduating and working, and of other school-specific outcomes (such as parents’ approval of the choice and whether the school’s teachings are consistent with the student’s ideology), conditional on enrolling in each school.² We use these data to estimate the preference parameter for (log)-consumption and for the non-pecuniary factors, and to examine how enrollment would change absent financial constraints.

The schools provided in the choice scenario cover three distinct school types belonging to different parts of the higher education spectrum in Pakistan. At one end, are Western-style universities that are similar to American colleges: they provide a liberal arts curriculum, are generally private and expensive, and are associated with high labor market returns. At the other end, are Madrassas – Islamic religious seminaries – whose curriculum focuses on religious and rational sciences and rhetoric without any secular or vocational training. Labor market returns to the degree they provide tend to be low. But Madrassas are generally free, and so may offer a viable alternative for families unable to afford more expensive schools. Finally, the third school type – Islamic universities – lie somewhere in the middle in terms of labor market returns, costs and curriculum: they provide a liberal arts curriculum combined with Islamic teachings and courses, and tend to be public.

We find substantial variation in students’ beliefs for the outcomes considered across the different schools, as well as significant heterogeneity in beliefs across individuals within each school. The subjective belief data paint a sensible picture though. For example, students believe on average that age 30 earnings conditional on working and graduating from a western-style

¹For example, Lochner and Monge-Naranjo (2012) highlight that, in a basic model in which investments in human capital only increase future earnings, unconstrained investment is independent of wealth while constrained investment is not. But that is not necessarily the case in a model allowing for non-pecuniary benefits of schooling.

²See Delavande et al. (2011) and Delavande (2014) for a review on subjective expectations in developing countries.

university are substantially higher than those conditional on graduating from a Madrassa. We use the stated school choice and the elicited subjective expectations to estimate our model of school choice. The estimates indicate that expected earnings are a significant determinant of the type of university chosen. However, the elasticity of school choice to earnings is not very high, and varies between 0.11-0.13. The order of magnitude is similar to that found in developed countries (Arcidiacono, 2004, Beffy et al., 2011, and Wiswall and Zafar, 2012). With respect to school-specific outcomes, we find that both parents' approval of the choice and the alignment of school's teachings with own ideology are very important drivers of the choice, and that students are willing to give up more than 35% of age 30 consumption to improve these outcomes by 5 percentage point.

We take advantage of the richness of the data to assess the validity of our structural model. We use the preference parameters from our choice model estimated using the stated school choice under current financial status and predict student's school choice when school costs are set to zero. We can then compare those predictions to respondents' stated school choice under the hypothetical scenario of no school costs. This is similar in spirit to assessing the validity of a structural model using an out-of-sample estimation (e.g., Todd and Wolpin, 2006, Galiani et al., 2012). Here, we do not compare the predictions to a different sample, but rather to the same sample in a different state of the world (one without school costs). The distribution of enrollment generated by the model is strikingly similar to those of the stated unconstrained school choices. This strengthens the credibility of the data quality, the modeling assumptions and our overall findings.

Having validated our model specification, we then use the estimates of the preference parameters from the structural model to simulate the impact of various policies in terms of students' welfare and enrollment. We focus on three sets of policy: one that relaxes financial constraints, another that disseminates information about the objective returns to school types, and a third that entails a reform of the curriculum taught in Madrassas. We find that relaxing financial constraints by providing students loans or free schooling paid out by the students as income tax during their working lives would increase students' welfare substantially, with an average gain equal to 21% of lifetime utility. Such reforms would cause more than a third of the students to switch schools, double enrollment at the best Western-style university, and slightly decreases Madrassa enrollment. These findings, based on the simulations, are comparable to the direct evidence we have on the role of financial constraints: about a third of the students switch their top ranked school when asked to assume that school costs are zero and enrollment at the best Western-style university doubles. Overall, this suggests that financial constraints play a significant role in school choice in a setting like Pakistan, where well-functioning credit markets lack, and borrowing or lending is not possible for schooling.

Turning to the role of information inefficiencies regarding returns to schooling (of which there

is increasing evidence, in several settings – see Wiswall and Zafar (2012) and references therein), we find that providing information about objective earnings associated with the different school types to students would have limited impact on enrollment. This is because most students accurately perceive the ranking of schools in terms of earnings, and because primarily relative earnings are what matter important for school choice. Finally, we investigate the impact of introducing secular subjects to the Madrassa curriculum, a reform currently underway in Pakistan. We simulate this reform in our model by assuming that it would equalize labor market returns of the Madrassas to those of Islamic Universities, keeping everything else the same. We find that such a reform would have limited impact on the choices of students, suggesting that the increase in labor market returns does not compensate the ideology and parental approval components associated with attending a Madrassa.

This paper relates to various strands of the literature on educational choice. First, it relates to a large literature investigating the role of credit constraints in higher education (see Lochner and Monge-Naranjo, 2012, for a review). Identifying whether credit constraints are important is difficult because researchers typically cannot identify who is credit constrained. One approach focuses on looking at the role of income (or wealth) on college attendance (and college’s quality), after controlling for the student’s ability and other family background (e.g., Belley and Lochner, 2007, Cameron and Heckman, 1998, Carneiro and Heckman, 2002, Lowenheim, 2011).³ Another approach uses differential returns to schooling for constrained and unconstrained students (e.g., Lang, 1993, Card, 1999, Cameron and Taber, 2004).⁴ A third approach estimates structural life-cycle schooling models and evaluate various policies, including relaxing borrowing constraints (e.g., Keane and Wolpin, 2001, Cameron and Taber, 2004). A final approach, developed by Stinebrickner and Stinebrickner (2008), is more direct and identifies credit-constrained students through a survey question asking about willingness to borrow money to increase consumption while in school. Our paper belongs to both the third and fourth approaches. On the one hand, we simulate the impact of various policies relaxing credit constraints on enrollment and welfare. On the other hand, we ask students which schools are within their current budget constraint, and which school they would attend without costs, which allows us to identify directly who is financially constrained, and what would happen to enrollment without those constraints.

Most of the literature cited above focuses on developed countries. Work in developing country settings on this issue is less common. Kaufman (2012) studies the importance of credit constraints in university attendance in Mexico and uses, like the current study, subjective expectations data on future earnings. She finds that differences in the expected returns of attending

³In the US context, family income has become a much more important determinant of college attendance since the early 2000s (Belley and Lochner, 2002), though the relationship between family income and attendance at selective high-quality university seems to have weakened (Kinsler and Pavan, 2010).

⁴Cameron and Taber (2004), for example, uses theoretical predictions about the different reactions of credit constrained students to the opportunity and direct costs of college, and find no evidence of credit constraints in the US context.

college (measured as difference in expected earnings conditional on working) in poor and rich are not sufficient to explain the income gradient in college attendance. She also finds that poor individuals with high expected returns are very responsive to changes in the direct cost of higher education, which is consistent with the existence of credit constraints. Gurgand et al. (2012) evaluate the role of credit constraints for university attendance in South Africa by comparing university enrollment rates of potential students, depending on whether they get a loan for their registration fees. They conclude that credit constraints decrease enrollment into higher education by more than 20 percentage points in a population of student loan applicants. Soulis (2011) finds that, in Chile, access to a loan program eliminates the income gradient in enrollment among students with similar test scores.

Our paper also belongs to a long tradition of work seeking to determine whether expectations about future earnings (or about returns to schooling) influence college attendance, college major or occupation choice (e.g., Willis and Rosen, 1979, Berger, 1988, Flyer, 1997, Arcidiacono, 2004, and Beffy et al., 2012). Without data on expectations, the prior literature makes various types of assumptions for the mapping between realized earnings and expected earnings. They rely on earnings data and the rational expectation assumption to predict individuals' earnings expectations. However, existing research from both developed and developing countries' settings has found that students (or households) tend to be misinformed about the returns to schooling as well as net costs (Jensen, 2010; Nguyen, 2010, Betts, 1996, Wiswall and Zafar, 2012, Hoxby and Turner, 2013, Bettinger et al., 2012, and Dinkelman and Martinez, 2012). This has prompted some empirical work on educational choice using expectations data about future earnings (e.g., Arcidiacono et al., 2012, Attanasio and Kaufman, 2012, Giustinelli, 2010, Wiswall and Zafar, 2011, Zafar, 2013). Arcidiacono et al. (2012) and Wiswall and Zafar (2011) estimate like us, a life-cycle model, focusing on major choice in the US context. Attanasio and Kaufman (2012), another related paper, examines the role of expectations about returns to schooling and of perceptions of labor market risks in the decision to continue further education. Using a reduced form approach, they find that expectations about future income are a significant predictor for the decision to enroll in college for boys, but not for girls. We complement these papers by taking into consideration non-pecuniary outcomes (such as ideology) and additional sources of uncertainty (e.g., regarding graduating and employment) which are then embedded into a structural model, by looking specifically at the role of financial constraints, and by being able to conduct an out-of-sample estimation as a validation of our structural model.

Our paper also builds upon a line of research on the role of non-pecuniary outcomes on educational choice (e.g., D'Haultfoeuille and Maurel, 2013, Easterlin, 1995, Fiorito and Daufenbach, 1982, Jacob and Lefgren, 2007, Weinberger, 2004). For example, Zafar (2012, 2013) find that enjoying studying the coursework and gaining approval of parents is instrumental in the choice of majors in the US context. Moreover, educational choice elasticities with respect to

earnings are typically low (e.g., Beffy et al., 2012, Wiswall and Zafar, 2011), suggesting similarly that non-pecuniary factors are important. In a developing country context, we also find non-pecuniary factors to be very important. Moreover, in our study, ignoring those non-pecuniary outcomes would increase the elasticity of school choice to expected earnings by a factor of 1.6. This is because expectations about non-pecuniary factors are correlated with expectations about monetary returns. This suggests it is important to elicit data on non-pecuniary factors when studying educational choices. First, because it can inform policy makers (or university administrations) about which factors to alter to promote enrollment. Second, because assuming that those non-pecuniary factors are orthogonal to monetary returns and can be left in the residual (which is what is implicitly done in studies that do not have direct information on those factors) is incorrect, and would yield biased estimates of choice responsiveness to earnings.

Our empirical analysis uses respondents' stated school choice, rather than actual choice, which is becoming common in many fields (Louviere et al., 2000). Whether stated preferences will be successful at eliciting responses that are as close as possible to individuals' actual behavior depends critically on how salient the event is for respondents and on whether they have already considered the scenario as a real possibility (McFadden, 1998). This is clearly the case in our set-up since we interviewed students who recently made a similar choice. The fact that we use stated preference is an advantage in many respects in our context. First, we do not need to worry about intra-household decision-making (studied by Giustinelli, 2010 and Attanasio and Kaufman, 2012), which complicates the analysis dramatically because it requires data about parental expectations and decision-making process. The students make their hypothetical school choice alone (but still take into consideration expectations about parental approval of their choice). Second, our design is similar in spirit to one in which respondents' expectations would be elicited before they make their educational decision. One may be worried about endogeneity and self-rationalization if we had instead used actual school choice.⁵ Finally, it allows us to abstract from other considerations, like likelihood of admissions into particular universities, which eases our evaluation of the direct role of financial constraints.

This paper is organized as follows. Section 2 outlines the model of school choice. Section 3 provides a brief discussion of the Pakistani schooling system. Section 4 describes the study design and data collection methodology. We examine heterogeneity in subjective beliefs about earnings and other school-specific outcomes, and stated school choice in Section 5. Section 6 reports estimates from a structural life-cycle utility model of school choice. Section 7 presents our policy experiments. Finally, Section 8 concludes.

⁵We discuss these issues in greater details in Section 6.2.6.

2 Model

In this section, we develop a simple model of school choice. A student lives for $T + 1$ periods. In period $t = 0$, the first period of his life, student i acquires education. At the beginning of the period, he chooses a school s where he enrolls. At the end of the period, he leaves school by either graduating or dropping out, and enters the labor market where he stays in period $t = 1, \dots, T$. In our set-up, the student's most important decision is the choice of school. The choice is important not only because it affects the stream of future earnings (and thus consumption) but also because of the following three individual- and school- specific factors that the student values: a_{is}^1 , whether the school's teachings are consistent with i 's ideology; a_{is}^2 , whether parents approve of the school, and; a_{is}^3 , i 's rank at the time of graduation from the school. In addition, i cares about whether the school is located in a different town as the one he currently resides, which is indicated by l_{is} . For tractability, we assume that the utility function is additively separable, linear in the school outcomes and location, and logarithmic in consumption. Thus, we have that the utility of individual i from attending school s is given by:

$$U_{is} = \sum_{j=1}^3 \alpha_j a_{is}^j + \delta l_{is} + \theta \sum_{t=0}^T \beta^t \ln(c_t) + \gamma_s + \varepsilon_{is},$$

where α_j is the utility value of outcome a_{is}^j , δ is the utility value of the school's location, β is the rate of time preference, c_t is i 's consumption at time t , θ is the utility value of log consumption, γ_s is a school-specific constant, and ε_{is} is a random term which is individual and school-specific and unobservable to the econometrician. Consistent with the lack of well-functioning credit markets in Pakistan, there is no borrowing or lending possible so student i will consume his earnings y_{it} at every period from $t = 1$ to T . At time $t = 0$, i needs to finance his schooling out of his parent's earnings y_{i0} and he faces expected costs C_{is} if he enrolls in school s . His per-period budget constraints are therefore given by:

$$\begin{aligned} c_0 + C_{is} &\leq y_{i0} \\ c_t &= y_{it} \text{ for } t = 1 \text{ to } T. \end{aligned} \tag{1}$$

Because he cannot borrow to finance the school cost, student i solves his maximization problem by restricting his choice set to schools for which the period zero budget constraint $c_0 + C_{is} \leq y_{i0}$ is not violated; that is, schools for which the costs do not exceed parents' income. Let S_i denotes the set of schools s that satisfy i 's period 0 budget constraint.

A key feature of the model is that, at $t = 0$, the student faces uncertainty about the school-specific outcomes as well as lifetime earnings associated with each choice. For example, i may be unsure about the type of teaching taking place in a school, how good he would be compared to other students, and the future labor market earnings if he were to graduate from a particular

school. Student i possesses beliefs about the distribution of these events, conditional on each school s . We denote this distribution by $G_{is}(\{a^j\}_{j=1}^3, \{y_t\}_{t=1}^T)$. The distributions of future events $G_{is}(\{a^j\}_{j=1}^3, \{y_t\}_{t=1}^T)$ represent “unresolvable” uncertainty as these events will not have occurred at the time of school choice. Student i chooses the school among his feasible choice set which maximizes his subjective expected utility subject to his budget constraints, that is, he solves:

$$\max_{s \in S_i} \int \left\{ \sum_{j=1}^3 \alpha_j a^j + \delta l_{is} + \theta \ln(y_{i0} - C_{is}) + \theta \sum_{t=1}^T \beta^t \ln(y_t) + \gamma_s + \varepsilon_{is} \right\} dG_{is}(\{a_j\}_{j=1}^3, \{y_t\}_{t=1}^T), \quad (2)$$

Subject to budget constraint (1)

Because of the separability assumption of the utility, only marginal beliefs matter in solving this maximization problem. We denote by $P_{is}(a^j)$ the marginal probability about the binary factors $a_{is}^j, \{j = 1, 2\}$, and let $E_{is}(a^3)$ be i 's expected graduation rank if he enrolls in school s . Regarding future earnings, student i is uncertain about whether he would successfully graduate or whether he would drop-out if he enrolls in school s ; about whether he would find a job in each of these cases, and; about what his earnings would be for each of these scenarios. Student i therefore possesses the following school-specific subjective probabilities: the probability $P_{is}(d)$ of dropping out from s if i enrolls in school s ; the probability $P_{is}(\text{job} | d)$ of finding a job if he drops out after enrolling in school s ; and the probability $P_{is}(\text{job} | g)$ of finding a job if he graduates from school s after enrolling in school s . He also possesses subjective expectations Y_{isht} about his labor earnings at time t if he enrolls in school s and either drops out ($h = d$) or graduates ($h = g$). We assume for simplicity that $P_{is}(\text{job} | d)$ and $P_{is}(\text{job} | g)$ are time-invariant. Since unemployment benefits do not exist in Pakistan, we normalize earnings to 1 if a student is not employed.

Equation (2) can now be written as:

$$\begin{aligned} & \max_{s \in S_i} \left\{ \sum_{j=1}^2 \alpha_j P_{is}(a^j) + \alpha_3 E_{is}(a^3) + \delta l_{is} + \theta \ln(y_{i0} - C_{is}) \right. \\ & + \theta \sum_{t=1}^T \beta^t [(P_{is}(d) P_{is}(\text{job} | d) \ln(Y_{isd_t}) + (1 - P_{is}(d)) P_{is}(\text{job} | g) \ln(Y_{isg_t}))] \\ & \left. + \gamma_s + \varepsilon_{is} \right\}. \end{aligned} \quad (3)$$

The goal is to infer the parameters of the utility function. The conventional approach is to use revealed preference data, where we typically observe a set of school choices, some measures of ability, and some realizations of future earnings to construct the elements of the utility function. With such data, the researcher has to assume a mapping between beliefs and realizations of outcomes (such as earnings, and ability) for the school that is chosen as well as the schools that

are not chosen. The prior literature makes various types of assumptions along these dimensions.⁶ This can be problematic since observed choices might be consistent with several combinations of expectations and preferences (Manski, 1993, 2004). By directly collecting data on students' subjective expectations about school-specific outcomes, we are able to relax these assumptions. Identification of the empirical choice model is discussed in section 6.

3 The Educational System in Pakistan

As per the Constitution of Pakistan, the federal government is required to provide free and compulsory education to children between the ages of 5 and 16 years. As a result, Pakistan has a public school system in addition a growing private education sector and a religious education sector. These three sectors provide pre-college education in four stages: primary (with a participation rate of 62%), middle (with a participation rate of 35%), secondary (with a participation rate of 23%), and intermediate/higher secondary (with a participation rate of 9%) (Lynd, 2007).

Private education institutions enroll 31% of students who are studying in basic education (preprimary through higher secondary). In urban centers, private schools account for more students (51%) than the public sector (49%) (Lynd, 2007). Madrassas (religious seminaries) admit students of all ages who are generally taught to read and memorize the Qu'ran. Specific sections are introduced at secondary and higher secondary levels to bridge the gap between Madrassa education and the formal education system in Pakistan (Nordic Recognition Information Centres, 2006).

The number of Madrassas in Pakistan has undeniably increased in the last decades, especially in the 1980s during the Soviet war in Afghanistan, when Madrassas were established in Afghan refugee camps to train fighters for the resistance movement (Winthrop and Graff, 2010). However, there is considerable disagreement over the extent of the penetration of Madrassas: Estimates of Madrassas' enrollment vary from less than 1% (Andrabi et al., 2006) to 33% (International Crisis Group Report, 2002) of all enrolled students. One reason why an accurate measure of Madrassa enrollment remains challenging is that few are registered- according to Rashid (2000), fewer than a third of Madrassas are registered. Recent studies put the enrollment in registered Madrassas in the 1-7% range (Fair, 2008; Pakistan Ministry of Education). Regardless of the source that one chooses, the overall picture indicates that a non-trivial fraction of Pakistani youth study in Madrassas.

⁶In his study of occupational choice, Freeman (1971), for example, assumes an adaptive expectations mapping between realized earnings and beliefs about earnings. In other occupational choice research, for example Siow (1984) makes perfect foresight (rational expectations) assumptions. Implicitly these models also assume that earnings are the same for all individuals. Other work on human capital investments, including Berger (1988), Flyer (1997), Arcidiacono (2004), and Beffy et al. (2011) allow for some heterogeneity in earnings, across chosen and counterfactual school choices, but assume rational expectations.

Higher education in Pakistan takes place in universities and colleges. In 2005, the enrollment rate for students ages 17-23 was 2.6%. In 1947, after the partition from India, Pakistan had only one university. By the early 1970s, the many private institutions of higher education that had been established were all nationalized. From the early 1980s, private universities were again allowed in Pakistan and the rising demand led to a large increase in their number (Nordic Recognition Information Centres, 2006). There are now 138 universities in the country, of which 75 are public and 63 private (Higher Education Commission Pakistan, 2012). In addition to the recognized private institutions, a large number of illegal private universities operate throughout the country but without the right to award degrees. Both public and private universities have their own entrance exams which are based on the SAT. Colleges may also base admission decisions on the Intermediate/Higher Secondary School Examination and/or a personal interview. It is also possible to continue higher education within the Madrassa system. The Madrassa curriculum at advanced stages focuses on the Dars-e-Nizami, which is taught for 8 years following the completion of elementary school. Advanced study within the Madrassas produces an Alim (Islamic scholar and/or teacher), a degree which is considered as equivalent to a Master's degree in Arabic and Islam by the University Grants Commission.

The three types of higher education institutions that we consider in this study represent distinct parts of the higher education spectrum in Pakistan. At one end, we have Western-style universities that are similar to American colleges. They provide a liberal arts curriculum, classes are taught in English, and campuses are mixed genders. These are private institutions that tend to be quite expensive, and so cater to wealthy students. Islamic Universities (IU), which are somewhere in the middle of the spectrum, provide a liberal arts curriculum combined with Islamic teachings and courses. For example, Economics is taught with a focus on Islamic principles of finance. These universities have segregated campuses for males and females, and classes are taught in Arabic or English. These institutions tend to be public and, therefore, are accessible to low and middle income groups. Finally, at the other end of the spectrum are Madrassas (M). The curriculum covers religious sciences (e.g., jurisprudence, the Qur'an and its commentaries) and rational sciences such as Arabic grammar and literature, logic, and rhetoric (Rahman, 2008). The materials for these subjects are texts dating to before the 14th century, and classes are typically taught in Arabic or Urdu (Fair, 2006; Rahman, 2004). The majority of Madrassas do not impart any secular or vocational training, and most of their graduates go on to work in the religious sector. A key feature of Madrassas is that they generally tend to be free, and may offer a viable alternative for families unable to afford more expensive schools (Singer, 2001).⁷ Another dimension in which these school types differ are the labor market returns associated with

⁷The empirical evidence regarding this is mixed: popular media and anecdotal evidence argues that the poorest families send their children to Madrassas (Rahman, 2004; Tavernise, 2009). Andrabi et al. (2006), however, argue against the hypothesis that poverty drives individuals to Madrassas: In their sample, they find little difference between poor and rich households in the choice of religious schooling.

them. While returns to schooling are high in a developing country context like Pakistan (Jaffry et al., 2007), the returns do differ by the type of school, with lower returns associated with public schooling (relative to private) and for Islamic education (Berman and Stepanyan, 2004; Asadullah, 2009).

4 Study Design

This section describes our sample, data collection methodology, and survey design.

4.1 The Sample

Our study was conducted in two Western-style universities, one Islamic University, and four Madrassas, all located in Islamabad/Rawalpindi and Lahore between May and October 2010. The Islamabad/Rawalpindi metropolitan area is the third largest in the country with a population of about 4.5 million, and Islamabad is Pakistan’s capital. Lahore is the capital of the Punjab province and the country’s second largest city with about 10 million inhabitants.

The institutions in our sample are among the five largest and best-regarded institutions in the relevant category in each city. Among all the institutions we contacted, one University and one Madrassa declined participation. We sampled the higher-level students in the four Madrassas since they are similar in age to university students, and are pursuing the Madrassa equivalent of a Bachelor’s degree. Though participation was voluntary, almost everyone in the Madrassas participated in the study. At the other institutions, a random sample of students was selected to participate based on a listing of students provided by the registrar’s office. Average response rate at the universities was about 70%. Overall 2,347 male students participated in the study.⁸

The two Western-style universities in our sample differ in their selectivity, reputation, and cost. We classify the more expensive, selective and reputable university as “Very Selective University” (VSU), with the other university classified as simply “Selective University” (SU). VSU, as we show below, tends to draw students from a higher socioeconomic segment of the population than those who attend SU. Since the four Madrassas in our sample are similar in terms of their student body composition, we pool the data across the four Madrassas.

4.2 Data Collection

Data collection was conducted by the Survey Center affiliated with the Islamic University. To signal credibility of the study to the students, members of the staff of the institution at which data

⁸Female students from the Western-style universities and IU also participated in the study. We restrict the analysis in this paper to male students, since the determinants of school choice are likely to differ by gender. Moreover, since female Madrassas tend to be very small, we surveyed Madrassas that cater to male students only. The full sample, before excluding females, consists of 2,836 students.

was being collected were also hired for the data collection. The survey sessions were conducted in groups of 50-100 students in a classroom of the student’s institution. The rooms were large enough to ensure respondent anonymity. An anonymous questionnaire was given to each participant, read out by a member of the survey team and projected on a computer projector. The survey instrument was administered in Urdu at all institutions except VSU where it was conducted in English, since students there are more used to reading and writing in English.

The survey took about 90 minutes to complete, and consisted of four parts. The first section collected data on determinants of schooling choices; the second consisted of experimental games, that included the trust and dictator game (see Delavande and Zafar, 2011 and 2013); the third collected demographic details of the respondents; attitudes and opinions on various social and political issues were elicited in the fourth section of the survey (see Delavande and Zafar, 2012). We use data collected in the first and third sections of the survey in this study. The survey instrument was anonymous and no identifying information was collected from the respondents. Students were compensated Rs. 200 (~USD 2.5) for completing the survey, and were additionally compensated for the experiments (average compensation for which was Rs. 600). The total average compensation of Rs. 800 (~USD 10) was substantial in the context of our setting.⁹

4.3 Sample Characteristics

Table 1 presents the characteristics of students at the four institution groups. As indicated by the low p-values of a F-test for the equality of the means of the characteristics across the schools (reported in the last column), there is substantial sorting in terms of observables into these institutions.

As we move across the columns from VSU towards M in Table 1, the average socioeconomic characteristics deteriorate. For example, the monthly parental income of VSU students is nearly twice that of SU students, about 4.5 times that of students at IU, and about 10 times that of M students. Similar patterns emerge with regards to parents’ education and asset ownership: the proportion of students with at least one college-educated parent declines from 90% for VSU students to about 12% for M students.

Students from the various groups also report different levels of self-reported religiosity. Students were asked to rate how religious they considered themselves on a scale from 0 (not religious at all) to 10 (very religious). As one may expect, religiosity increases as we move across columns of Table 1: The average religiosity is 5.3 for VSU students and 9.2 for M students.

Finally, the students also differ in the type of high school they attended, with 75% of the VSU students having attended a private school compared to only 10% of the M students. Regarding

⁹The 2009 per capita GNI at purchasing power parity in Pakistan was \$2,710, compared to \$46,730 in the US. This means the average compensation of USD 10 corresponds to 0.4% of the GNI per capita. The US equivalent would be approximately USD 170.

the financing of educational expenses, Table 1 shows that M students are more likely to rely on loans and personal savings and earnings, and less likely to rely on parents and family than their counterparts.

4.4 Survey Instrument

For the purposes of understanding school choice, we asked respondents to consider the following hypothetical situation:

"The following questions below ask you to consider some hypothetical enrollment choices assuming that you did not start your degree at your current institution. Suppose that you were guaranteed admission in:

the Bachelor's degree program at Very Selective University

the Bachelor's degree program at Selective University

the Bachelor's degree program at Islamic University

the Alim course at Madrassa-City1

the Alim course at Madrassa-City 2

Suppose further that you were guaranteed admission only at those 5 institutions. We ask you to think about where you would choose to go..."

In the questionnaire, students saw the actual name of each of the institutions. The school the student was currently enrolled in was included in the list. And, depending on the city the student was in, two or three of the five schools were located in the student's current city. As mentioned above, the institutions we chose are among the five-largest in their relevant category in their respective city. However, to make sure that students were familiar with them, we provided students with a 2-sentence blurb that described each school.

As a first step, students were asked to specify the set of schools that they could afford to attend financially (i.e., the constrained choice set S_i from Section 2) by stating, for each institution, whether "[you] think that [you] could afford financially (taking into account financial aid such as scholarships, loans and grants that you may be able to secure) to attend" it. We refer to this as the *constrained* choice set.

Students were then asked various questions about where they would choose to enroll. First, they were asked to rank, in terms of their preference for enrolling in them, the institutions belonging to the constrained choice set (since the student's current institution was included in the list of schools, the student's restricted choice set would have included at least their current school). Second, students were told to consider a scenario where all expenses would be covered: "As before, suppose that you are guaranteed admission in each of these five schools, and that you are provided WITH financial aid such that ALL your expenses (tuition, boarding, room, etc.) are paid for at each institution." In this scenario, all 5 schools are part of all students' choice set. We call this the *unconstrained* choice set. Students were then asked to rank all 5 institutions

in terms of their preference for enrolling in them: "...rank *EACH* institution according to your preference for enrolling in them (1- most preferred; 5- least preferred)".

Section 2 described a set of individual and school-specific subjective beliefs that are relevant for students' school choice. We collected data on *all of those* as part of our survey. In addition, we collected data on expected monthly expenses (including net tuition, and room and board) at each institution, and beliefs about the average earnings of a typical male graduate of each of these institutions. We discuss below the specific format of some of the questions.

As is standard in studies that collect subjective data, a short introduction (similar to the one in Delavande 2008) was provided to the respondents at the start of the survey. Prior to the schooling section, students were asked several practice questions to familiarize them with the format of the questions and to make sure they understood how to answer questions based on the use of ranking and percentages.

5 Description of Expectations and Preferences

In this section, we analyze basic patterns of the subjective expectations questions, and describe the heterogeneity in expectations about population average earnings and self expected earnings at age 30, the subjective expectations for other school-specific outcomes, as well as the preference ordering of students over the schools. To facilitate the reading of the tables and description of results, we use the acronyms VSU, SU, IU and M when referring to the schools where students are currently enrolled, and we use the full names (Very Selective University, Selective University, Islamic University and Madrassa City 1 or 2) when referring to the hypothetical set of schools that students could enrol.

5.1 Expectations about Future Earnings

Students were asked two sets of earnings expectations, conditional on graduating from each school and working. First, respondents were asked about their *own* age 30 earnings conditional on graduation as well as dropping out from each of the schools, as those expectations are the relevant ones for their decision-making process (see Section 2). However, expectations about self earnings may differ from objective measures of earnings of current graduates for several reasons: respondents may, for example, have private information about themselves that justifies having different expectations, or they might think that future earnings' distributions will differ from the current ones. Because of this, and in order to investigate whether students are aware of differential labor market outcomes to each of these schools, we also collected their beliefs about the average earnings at age 30 of a typical male graduate of each of these institutions. We refer to these as beliefs about *population* earnings. Students were also asked about the probability of

being employed conditional on graduating as well as dropping out from each of those schools. We describe each of these expectations in turn.

5.1.1 Expectations about Population Earnings

Expectations about population earnings were elicited as follows: "*Consider a typical male student who graduates from each of the institutions below and who is working at age 30. Think about the kinds of jobs that will be available to him. How much do you think he could earn per MONTH on AVERAGE at the age of 30 at these jobs?*". Table 2 shows the mean, median, and standard deviation of respondents' beliefs about the average earnings of current age 30 graduates from each of the schools and for the entire sample. Each column shows the beliefs held by students from a given institution. In column (1), which pools students from all institutions, we see that the mean belief about monthly population earnings varies between Rs. 17,000 for Madrassa graduates to Rs. 46,000 for Very Selective University graduates. Selective University and Islamic University graduates are believed to have earnings that are somewhere in the middle. Median earnings beliefs also follow a similar pattern. The last row of the table shows that we can reject the equality of the beliefs about average earnings for graduates across the five schools choices. There is, however, considerable heterogeneity in beliefs as indicated by the large standard deviation in beliefs about the population means. For example, for Very Selective University graduates, the overall median earnings are Rs. 40,000, while the 10th percentile is Rs. 9,000 and the 90th percentile is Rs 80,000. The table also reports the response rates, and we see that they are above 99%, indicating that missing data are not an issue.

Columns (2)-(5) of the table present the average population beliefs, as reported by students currently enrolled in the four school types. The level of earnings reported by students in the four schools differ quite substantially for each of the five school choices- the last column of the table reports the p-value of a test for the equality of the mean average population beliefs reported by the students in the different schools for each of the school choices, and we reject the null hypothesis of equality in each case. However, despite differences in levels, relative beliefs about population earnings across the different school types are the same for each of the groups: students enrolled in each of the four school types expect the average earnings to be the highest for Very Selective University graduates, and the lowest for Madrassa graduates.

The first five columns of Table 2 indicate that students expect labor market returns associated with the five school types to differ significantly. A relevant question for policy-makers is whether these perceptions are accurate. To investigate that, one would need to know the "true" population earnings. However, these data do not exist, since none of these schools follow their graduates over time and collect data on their labor marker outcomes. In order to shed light on how well-informed students are, we instead conducted a poll of a handful of administrators at each of these

schools, and asked them about the average earnings of their recent graduates.¹⁰ These statistics are reported in column (7) of the table. While these data are based on small sample sizes and on perceptions of administrators, they are still informative. The median earnings beliefs of the students (in column 1) are very similar to the medians reported by the school administrators. More importantly, both sources of data yield a similar ranking of schools based on earnings. This suggests that students' perceptions about relative earnings are fairly accurate.

Another point of note in Table 2 is that students enrolled in SU and IU report substantially higher earnings for graduates of their own schools, than their counterparts (that is students enrolled in all other schools, reported in column 6); their perceptions also tend to be less accurate when compared to those of the administrators. For example, SU students expect average earnings of Selective University graduates to be \$45,900, while their counterparts expect Selective University graduates to make \$33,500. And, based on the poll of administrators, recent Selective University graduates' average earnings are \$30,900. On the other hand, M students report substantially lower earnings for Madrassa graduates than their counterparts, and also seem to have more accurate perceptions.

5.1.2 Expectations about Own Future Earnings

Expectations about own age 30 earnings were elicited as follows: “*Consider the hypothetical situation where you graduate from each of the institutions listed below. Look ahead to when you will be 30 years old and suppose that you are working then. Think about the kinds of jobs that will be available to you. How much do you think you could earn per MONTH on AVERAGE at the age of 30 at these jobs?*” The top panel of Table 3 reports the average, median, and standard deviation of reported expected age 30 earnings in our sample. As in Table 2, each column shows the beliefs held by students from a given institution. Again, we see that the response rates exceed 94%.

Pooling all students in column (1), we see that expectations about own earnings follow the same pattern as expectations about population beliefs, with students believing their earnings will be highest if they graduate from Very Selective University, and lowest if they graduate from a Madrassa. A comparison of the first column with population beliefs (in column (1) of Table 2) shows that expectations about own and population earnings are very similar. We find a significant correlation of 0.713 between own and population earnings expectations in our sample (Spearman rank; p-value = 0.000), suggesting that own earnings expectations are based in part on the individuals' beliefs about the population distribution of earnings. This high correlation also suggests that if respondents are misinformed about the distribution of population earnings, they will have biased own earnings expectations.

¹⁰A separate survey was designed for the school administrators. This was filled out by 4 administrators at each of VSU, SU, M-City1, and M-City2, and by 3 administrators at IU.

The remaining columns in Panel A of Table 3 show that own earnings expectations of students in each of the schools follow the same pattern. For example, average self earnings reported by IU students are Rs. 60,800 if there were to graduate from Very Selective University (higher than those reported by VSU and SU students), are about a third lower if they were to graduate from Islamic University (Rs. 44,100), and are about two-thirds lower if they were to graduate from one of the Madrassas. We see again that, while relative earnings are similar across institutions, the levels are quite different. Furthermore, column (6) shows that average earnings beliefs for non-M (VSU, SU and IU) students conditional on graduating from the institution they are currently enrolled in are higher than those of their counterparts (for example, IU students' average annual earnings expectations conditional on graduating from Islamic University are Rs. 44,100, while those of their counterparts are Rs. 31,300; difference statistically significant with p-value < 0.01). On the other hand, M students' average earnings conditional on graduating from a Madrassa are lower than those of their counterparts.

Like the population expectations, there is substantial heterogeneity in own earnings expectations, as seen in the large standard deviations (relative to the means). For example, median own expected earnings for the overall sample conditional on graduating from Very Selective University are Rs. 40,000, while the 10th percentile is Rs. 10,000 and the 90th percentile is Rs. 88,000. Figure 1 presents VSU students' belief distribution of age 30 earnings, conditional on graduating from each of the five schools. There is considerable dispersion in earnings beliefs conditional on each choice. The earnings distributions conditional on graduating from the non-Madrassa schools are similar, with fat right tails. On the other hand, the earnings distributions conditional on graduating from a Madrassa are concentrated to the left (right skewed). Figure 2, which reports earnings beliefs conditional on graduating from Islamic University, highlights the heterogeneity in beliefs across students enrolled in the different schools: the modal belief of Madrassa students is significantly lower than that of other students, while the distribution of Very Selective University students is less concentrated.

Panel B of Table 3 shows respondents' own earnings expectations at age 30 conditional on enrolling in each of the schools, but dropping out without a degree.¹¹ Respondents report significantly lower earnings on average in this case: for example, average expected earnings conditional on dropping out of Very Selective University are only half as much as those conditional on graduating from there (Rs. 24,700 versus Rs. 46,200; difference statistically significant with p-value < 0.001). Notably, students expect to have better labor market outcomes were they to enroll and then drop out from any of the non-Madrassa institutions, than if they were to graduate from

¹¹Earnings conditional on drop-out were elicited as follows: "*Consider the hypothetical situation where you are enrolled in each of the institutions listed below, and you DROP OUT of that institution without completing the degree. Look ahead to when you will be 30 years old and suppose that you are working then. Think about the kinds of jobs that will be available to you. How much do you think you could earn per MONTH on AVERAGE at the age of 30 at these jobs?*".

a Madrassa. Moreover, M students do not expect very different labor market returns, conditional on completing a Madrassa degree or not: average beliefs reported by Madrassa students conditional on a degree from Madrassa-City1 are Rs. 11,000, and conditional on enrolling and dropping out of Madrassa-City1 are Rs. 10,600 (difference not statistically significant; p-value = 0.2131).

Overall, these patterns suggest that students expect different labor market returns, conditional on working, to each of these schools, and also expect a higher return to a non-Madrassa degree than to not having a college degree. However, our respondents – even those who are enrolled in Madrassas – do not expect a Madrassa degree to improve labor market earnings, conditional on working.

5.1.3 Graduation and Employment Expectations

Earnings conditional on graduating and working need to be discounted by the probability of employment conditional on graduating and the probability of graduating. Similarly, earnings conditional on dropping out and working need to be discounted by the probability of employment conditional on dropping out and the probability of dropping out (see Section 2). Students were asked the probability that they would graduate from each school conditional on enrolling, and all the relevant employment probabilities at age 30.¹²

Table 4 shows the average probabilities for all these outcomes. A notable feature of the table is that almost all students are able and willing to answer these questions. The response rate in the top 3 panels exceeds 98%, while the response rate for expected log earnings (which is derived from several beliefs) exceeds 94%. Regarding the probability of graduating, students believe they are on average more likely to graduate from the school they are currently enrolled in, suggestive of positive sorting into institutions along this dimension. Note that M students expect to be twice as likely to graduate from a Madrassa than from a Very Selective or Selective University.

Regarding age 30 employment, VSU, SU and IU students report a higher average probability of having a job conditional on graduating from a non-Madrassa institution as opposed to graduating from a Madrassa, and all have a higher average probability of employment conditional on graduation from Very Selective University. M students, however, report a higher probability of age 30 employment conditional on graduating from a Madrassa. The probability of employment conditional on dropping out follows a similar pattern, with levels being often about 20-30 percentage points lower.

Again, there is substantial heterogeneity in beliefs within each institution, as well as across school choices. Figure 3 shows SU students' distribution of employment probability conditional

¹²For example, they were asked: “Consider the hypothetical situation where you graduate from each of the institutions listed below. Look ahead to when you will be 30 years old. What do you think is the percent chance (or chances out of 100) that you would have a job at the age of 30?”.

on graduating from each of the choices. We see substantial heterogeneity in this belief for a given choice. Furthermore, the belief distribution conditional on graduating from Very Selective University first order stochastically dominates the other four distributions. While about 20 percent of SU students believe that there is a greater than 80 percent chance of being employed at age 30 were they to graduate from either Madrassa, more than 60 percent of them believe that to be the case if they graduate from Very Selective University (and about 40 percent of them believe that to be the case if they graduate from either Selective University or Islamic University).

The last panel of Table 4 shows the age 30 expected log earnings (corresponding to $t=10$ in Section 2) given by $[(P_{is}(d)P_{is}(job | d) \ln(Y_{isd10}) + (1 - P_{is}(d))P_{is}(job | g) \ln(Y_{isg10})]$. Section 2 highlights that this is an important determinant of school choice. For non-M students, Very Selective University stands out as the school yielding the highest age 30 expected log earnings. Note that M students view Madrassas as yielding the highest age 30 expected log earnings; this is despite the fact that they view earnings at Madrassas to be substantially lower (see the top panel of Table 4), and because they anticipate higher chance of graduating and higher employment opportunity conditional on enrolling from a Madrassa.

5.2 Beliefs about School-Specific Factors

Besides data on labor market outcomes, we also collected data on beliefs of students for other factors that may affect the likelihood of a student choosing that school. The set of factors that we include are: (1) alignment of the school's teachings with own ideology, (2) graduation rank, (3) parents' approval of the choice, and (4) monthly expenses (including tuition). Students were asked for their beliefs about each of these factors, conditional on having enrolled in each of the five different school choices.¹³ Table 5 reports the average beliefs for these outcomes. The response rates to these questions exceed 97 percent.

Within each panel, we see that the average beliefs for the outcome conditional on the five school choices differ significantly (as can be seen by the low p-values of the F-test in the last row of each panel), and that there are significant differences in average beliefs for a given school choice across students of the different schools (as shown by the low p-value of the F-test in the last column).

We also see that students tend to have more favorable beliefs about the likelihood of the outcomes, conditional on being enrolled their current school. For example, students in each of

¹³For example, beliefs about (1) were asked as follows: "*Consider the situation where you decided to enroll as a student in each of the institutions listed below. What do you think is the percent chance (or chances out of 100) that the materials taught to you at each of these institutions would be consistent with your own ideology and thinking?*". Graduation rank was elicited on a 1-100 scale, where 1 meant the best rank. To provide easier interpretation, we re-scaled the graduation rank beliefs such that 100 represents highest rank and 1 represents lowest rank.

the schools (columns 2-5) report the highest average beliefs for parents’ approval and graduation rank for the school they are currently enrolled in.¹⁴ This indicates that students are positively sorting into schools.

The means reported in Table 5 mask the heterogeneity in students’ beliefs, both within institution as well as across the schools. Figure 4 shows the dispersion in students’ beliefs about teachings at Madrassa-City1 being consistent with their own ideology. We see that only 20 percent of M students assign a probability of less than 70 percent to this outcome; on the other hand, nearly 95 percent of the students at VSU, and about three-quarter of the students at SU and IU assign a probability of less than 70 percent to the teachings at Madrassa-City1 being consistent with their own ideology.

On the whole, analysis of the subjective expectations indicates that students perceive significant differences across the school choices along the various dimensions. Moreover, there is substantial heterogeneity in beliefs of students enrolled *within* a school, as well as *across* schools. This section also highlights the advantage of eliciting beliefs for binary outcomes as probabilistic expectations since simple binary responses would be unable to unmask this heterogeneity entirely. Finally, an advantage of eliciting subjective beliefs is that one can also elicit quantitative beliefs about non-pecuniary outcomes (such as parents’ approval)– data on which are otherwise not available, and generally such outcomes are subsumed in the residual term.

Table A1 reports the correlation between the various beliefs. We see a strong positive correlation between the subjective beliefs. For example, the correlation between beliefs about parents’ approval and beliefs about alignment of the school’s teachings with one’s ideology (pooled across all school choices) is 0.66, and the correlation between age 30 expected log earnings and beliefs about alignment of the school’s teachings with one’s ideology is 0.50.

5.3 Stated Choice Data

As explained in section 4.4, the survey elicited ranking preferences about school enrollment from students. They were first asked to rank only those schools out of the five choices that they could financially afford to enroll in (constrained choice), and then were asked to rank all 5 schools under the assumptions that all costs would be paid (unconstrained choice).

5.3.1 Constrained Choice

The top panel of Table 6 shows the statistics related to constrained choice. Only about 41% and 54% of the students report being able to afford attending Very Selective University and Selective University, respectively. On the other hand, nearly all students report being able to cover the

¹⁴One may be concerned that students are reporting beliefs to rationalize their school choice. We investigate ex-post rationalization in a later section.

costs of attending Madrassas. This is consistent with the high costs of actually attending the universities, and practically no tuition at Madrassas (as also indicated in column (7) of Table 5). As we move across the columns, the proportion of students who can attend each school type generally decreases; this variation is quite sensible since Table 1 shows that socioeconomic characteristics of students deteriorate moving from VSU to M.

The top panel also shows the proportion of students who rank each of the schools as their top choice. As indicated by the p-values in the last column of the table, there is substantial variation in proportion of students across the various schools who rank each choice the highest. For example, Very Selective University is ranked highest by 89% of VSU students, 19% of SU students, 8% of IU students, and less than 1% of M students. This variation is likely a result of either differences in preferences and/or feasibility of the choice. For example, we see that 44% of SU students say they cannot afford Very Selective University. By construction, therefore, at least 44% of SU students could not have ranked Very Selective University the highest. In fact, we see that the median number of schools (out of five) ranked by students is only 2 for M students—that is, the median M student reports being able to afford only the two Madrassas (and hence only ranks them). Similarly, the median IU student only ranks three schools, and the median SU student ranks four schools. This indicates that affordability play an important role in students’ choices.

It is also interesting to note that 25% of the students do not rank their own school as their first choice. The hypothetical scenario asks students to assume that they have been admitted to all the schools considered. A primary reason for a different choice may be the fact that some students have not been able to gain admission to their preferred school. Other reasons include the fact that parents may have made the choice for them, or that they have learned new information about the various schools since they made their choice (we discuss the latter in Section 6.2.6).

5.3.2 Unconstrained Choice

The lower panel of Table 6 reports the unconstrained choice of the students. Comparing the first column in the lower panel to that in Panel A, we see that the proportion of students assigning the highest rank to VSU more than doubles to 36%, while the other proportions are lower (all these proportions are significantly different from their corresponding values in Panel A at the 1% level, using a Chi-square test).

Two patterns are of note in this panel. One, we see that amongst SU and IU students, the proportion who assign the highest rank to Very Selective University is substantially higher than the proportion who rank their current institution the highest. Absent school costs and assuming guaranteed admissions, the majority of SU and IU students (74% and 58%, respectively) would enroll in Very Selective University. Second, while the increase in M students who rank Very Selective University is small (from 0.18% to 1.7%), there is a large jump in the proportion of

students who now rank Islamic University the highest (12% compared to 1% in the presence of school costs). The panel also reports the proportion of students who switch their top-ranked school with the waiver of costs: We see that nearly a third of students would choose a different school, were it not for school costs.

These pattern suggest that, even if there were no schooling costs, M students would be unlikely to switch to institutions with a secular and liberal arts education. However, a sizable proportion of them would instead enroll in Islamic University– a school with secular teachings but with a religious emphasis. This suggests that both financial constraints as well as non-pecuniary factors, such as ideology of the school, are possibly important drivers of the choice. In the next section, we turn to the estimation of the model of school choice.

6 Empirical Results

We first discuss identification of the choice model outlined in Section 2, and then discuss the estimation results.

6.1 Model specification and Identification

We estimate the parameters of the utility function described in Section 2 using the subjective data described in the previous section. Because of survey time limitations, we were forced to ask a limited set of questions, and could not ask respondents to report their earnings for all post-graduation periods. Since we ask students for expected earnings (conditional on school drop-out as well as graduation) for age 30 only, we make some functional assumptions about how earnings evolve over the life-cycle.¹⁵ For simplicity, we assume that all labor earnings in year t grow exponentially at a yearly rate of g_t , as follows: $Y_{isht} = (Y_{isht-1})^{g_t-1}$, for all schools s and $h = \{d, g\}$ and $t > 1$. We can therefore rewrite time t earnings as a function of age 30 earnings

Y_{ish10} as follows:¹⁶ $Y_{isht} = (Y_{ish10})^{\frac{\prod_{l=1}^{t-1} g_l}{9}}$. Student i 's maximization problem in equation (3) as a function of age 30 labor earnings is then:

¹⁵Note, that we do not explicitly model any of the choices during or after school (such as, choice to take particular courses in school, how many hours to work, whether to pursue a post-graduate degree); however, these choices should be implicitly factored into the beliefs that are reported by the students.

¹⁶Assuming that students reach age 30 in period $t = 10$ is without loss of generality.

$$\begin{aligned} & \max_{s \in S_i} \left\{ \sum_{j=1}^2 \alpha_j P_{is}(a^j) + \alpha_3 E_{is}(a^3) + \delta l_{is} + \theta \ln(y_{i0} - C_{is}) \right. \\ & \left. + \theta \sum_{t=1}^T \beta^t \left[(P_{is}(d)P_{is}(job | d) \frac{\prod_{l=1}^{t-1} g_l}{9} \ln(Y_{isd10}) + (1 - P_{is}(d))P_{is}(job | g) \frac{\prod_{l=1}^{t-1} g_l}{9} \ln(Y_{isg10})) \right] \right. \\ & \left. + \gamma_s + \varepsilon_{is} \right\}. \end{aligned} \quad (4)$$

which is equivalent to

$$\begin{aligned} & \max_{s \in S_i} \left\{ \sum_{j=1}^2 \alpha_j P_{is}(a^j) + \alpha_3 E_{is}(a^3) + \delta l_{is} + \theta \ln(y_{i0} - C_{is}) \right. \\ & \left. + \theta^* [(P_{is}(d)P_{is}(job | d) \ln(Y_{isd10}) + (1 - P_{is}(d))P_{is}(job | g) \ln(Y_{isg10}))] + \gamma_s + \varepsilon_{is} \right\} \end{aligned} \quad (5)$$

where $\theta^* = \theta \sum_{t=1}^T \beta^t \left[\frac{\prod_{l=1}^{t-1} g_{sl}}{9} \right]$. Note that, equation (5) implicitly assumes that there is no

uncertainty in Y_{ish10} for $h = \{d, g\}$, that is, the student knows with certainty his earnings at age 30 if he enrolls in school s and either drops out or graduates. We relax this assumption later in Section 6.2.6, using information on the entire distribution of earnings students expect to have. The utility parameters $\{\alpha_j\}_{j=1}^3$, δ , θ , θ^* , and γ_S are the ones to estimate. In order to ensure strict preferences between choices, the ε_{is} 's are assumed to have a continuous distribution.

Under the assumption that the random terms $\{\varepsilon_{is}\}$ are independent for every individual i and choice s , and that they have a Type I extreme value distribution, the probability that student i chooses school s , π_{is} , in the hypothetical constraint case is:

$$\pi_{is} = \frac{\exp(\tilde{U}_{is})}{\sum_{s \in S_i} \exp(\tilde{U}_{is})}, \quad (6)$$

where \tilde{U}_{is} is the expected utility maximized in equation (5), net of ε_{is} .

As mentioned earlier, respondents were asked to rank all the schools in their choice set. The ranking data provide additional information that can also potentially be used for estimation of the model parameters. Under the assumptions of standard logit, the probability of any ranking of alternatives can be written as a product of logits (Luce and Suppes, 1965).¹⁷ This expression follows from the Independence of Irrelevant Alternatives (IIA) property embedded in the Type

¹⁷For example, consider the case where an individual's choice set is $\{a, b, c, d\}$. Suppose he ranks the alternatives b, d, c, a from best to worst. Under the assumption that the ε_{ij} 's are iid and Type I distributed, the probability of observing this preference ordering can be written as the product of the probability of choosing alternative b from $\{a, b, c, d\}$, the probability of choosing d from $\{a, c, d\}$, and the probability of choosing c from the remaining $\{a, c\}$. If $U_{ij} = \beta x_{ij} + \varepsilon_{ij}$ denotes the utility i gets from choosing j for $j \in \{a, b, c, d\}$, then the probability of

1 extreme value distribution assumption.

Under these parametric assumptions, the parameters of interest, $\{\alpha_j\}_{j=1}^3$, θ , θ^* , and γ_s , are identified off of the variation in expectations across individuals and schools when we consider the constrained choice. As outlined in section 5, there is substantial heterogeneity in the subjective data. Finally, the schools that students were asked to rank in the hypothetical scenario were located in two cities, and so the variation in the schools' locations identifies δ ; in the empirical model l_s is simply a dummy that equals 1 if school s is in a city different from i 's location where he takes the survey, and zero otherwise.

Note that students were also asked their stated school choice under the scenario of not cost. This gives us an additional opportunity to estimate the parameter of the utility function. In this unconstrained choice, $\ln(y_{i0} - C_{is})$ becomes $\ln(y_{i0})$ for all schools in i 's unconstrained choice set, and the parameter θ is therefore not identified. Our preferred estimation is based on the constrained choice scenario since it also identifies the current period consumption parameter. However, the downside is that estimates based on the constrained choice set do not use respondents with only one choice in their choice set. We therefore conduct some validation exercises based on estimation using the unconstrained choice set where students all have 5 schools in their choice set (see section 6.2.6).¹⁸

6.2 Baseline Model Estimates

Column (1) of Table 7 presents the maximum-likelihood estimates using the preferred choice in the case of the constrained choice set. The relative magnitudes of the first two estimates show the importance of the school-specific outcomes in the choice. The estimates for teaching aligned with ideology and parents' approval are positive and statistically different from zero at 1%, suggesting that they are significant determinants of school choice. In terms of magnitude, the estimate is the largest for the alignment of the school's teachings with one's own ideology, followed by parents' approval. The estimate of school location, δ , is also very precise and negative, suggesting that students have a strong preference for schools located in the same city as their current location. Finally, the coefficient on age 30 expected log earnings is positive and significantly different from zero, suggesting that lifetime earnings are also an important factor in school choice. The coefficient

observing $b \succ d \succ c \succ a$ is simply:

$$\Pr(b \succ d \succ c \succ a) = \frac{\exp(\beta x_{ib})}{\sum_{j \in \{a,b,c,d\}} \exp(\beta x_{ij})} \cdot \frac{\exp(\beta x_{id})}{\sum_{j \in \{a,c,d\}} \exp(\beta x_{ij})} \frac{\exp(\beta x_{ic})}{\sum_{j \in \{a,c\}} \exp(\beta x_{ij})}.$$

¹⁸Our surveys was done with students currently enrolled in college, so our estimation requires us to take into account the choice-based sampling. Manski and Lerman (1977) show that maximum likelihood estimators are consistent under the logit functional form assumption and if the model includes a choice-specific constant (the inconsistency being confined to the estimates of these constants) The specification in (4) already includes choice-specific constants, γ_s . Because we estimate our model based on stated preference, we implicitly assumed that students were surveyed in their top ranked institution.

on graduation rank is close to zero and unprecisely estimated. Similarly, while the coefficient on current period consumption is positive, it is economically small and not very precisely estimated. Column (2) of the table reports the maximum-likelihood estimates based on the ranking data, and results are qualitatively similar to those reported in the first column based on ranking data. The coefficient on graduation rank is still small but now statistically significant at 5%.

6.2.1 Model Fit and “Out-of-sample” Validation

Next, we assess the fit of the estimated model and compare the predicted choice to the stated choice in the data. The first column of Table 8 shows the proportion of respondents in our sample who rank the school the highest in the constrained case. Column (2) and (3) report the predicted probabilities of school choice using the estimated parameters from our model based on the preferred choice and the ranking data respectively (that is, estimates from the first and second column of Table 7). The model fits the choice probabilities quite well, with only slight deviations between predicted model probabilities and those from the stated choice data. For example, 17.8% of the students state that Very Selective University is their preferred school, while the model based on choice data predicts that 18.4% of the students would choose it.

Using the fact that we asked students to report their school choice both with and without financial constraint, we next evaluate our model fit by conducting an exercise similar in spirit to an “out-of-sample” validation test. In particular, we use the estimates from our choice model based on the constrained stated school choice (that is, estimates in the first and second column of Table 7) and predict student’s school choice when school costs are set to zero. We can then compare these predictions to students’ unconstrained stated school choice. This out-of-sample estimation does not compare the predictions for a different sample, but rather for the same sample in a different state of the world (i.e., one without school costs). The enrollment generated by the predictions based on the preferred choice are very similar to those of the unconstrained stated school choices (Column (5) of Table 8). For example, 35.8% (resp. 14.8%) of the students stated that they would enroll in the Very Selective University (resp. Islamic University) without school cost, while the model predicts an average probability of enrollment of 37.2% (resp. 15.4%). Overall, this provides strong evidence in favor of the model specification and data quality.

The predictions based on the ranking data are also fitting well, though less than the ones based on the choice data. We use a weighted squared loss criteria to assess the fit of the prediction (i.e., $\sum_{i=1}^5 w_i (w_i - p_i)^2$ where w_i is the enrollment in school i derived from the stated choice and p_i is the predicted enrollment). Because the model based on the choice data performed better than the model based on the ranking data in this out-of-sample validation according to the weighted squared loss criteria, we use it as our preferred benchmark.

6.2.2 Choice Elasticity

We next investigate what our model estimates imply about the responsiveness of school choice to changes in self earnings. For each school, we increase beliefs regarding own earnings at age 30 (conditional on both graduating as well as drop-out) by 1 percent. Based on the assumptions in our empirical model, any change in age 30 earnings will also impact life-cycle earnings. To assess how much more likely students would be to choose each school due to this increase in earnings, we compute choice elasticities (i.e., the percentage increase in the predicted probability of choosing a given school given by the 1 percent increase in future earnings at that school).

The first column of Table 9 shows the average response to earnings changes, based on model estimates using the preferred choice data. The mean elasticity is about 0.11%, and changes little depending on the school choice. Our results of a relatively low response to changes in earnings is consistent with other studies of schooling choice (Arcidiacono, 2004; Beffy et al., 2011; Wiswall and Zafar, 2012). For example, Beffy et al. (2011), using data on French students, estimate earnings elasticities of between 0.09-0.12 percentage points, depending on the major.

6.2.3 Interpreting the Estimates

We can gain insight into the magnitude of the estimated parameters by translating the differences of utility levels into age 30 consumption that would make the student indifferent between giving up age 30 consumption and experiencing the outcome considered. Say, we are interested in determining the willingness to pay (WTP) to experience outcome a_j with probability P_2 instead of probability P_1 , other things being equal. Based on our empirical model in (4), this implies the following indifference condition:

$$\alpha_j P_1(a_j) + \theta^* \ln(c_{10}) = \alpha_j P_2(a_j) + \theta^* \ln(c_{10} + WTP)$$

The WTP is then $[\exp(\frac{\alpha_j(P_1(a_j)-P_2(a_j))}{\theta^*}) - 1]c_{10}$. So, for example, increasing the chance of gaining parents' approval by 5 percent points, that is, $P_2 = P_1 + 0.05$, would yield a WTP of 0.357, based on the estimates in column (1) of Table 7. That is, students are on average willing to give up 35.7% of their age 30 consumption to increase the chance of gaining parents' approval of their school choice by 5 percentage points.

The first column of Table 10 reports the willingness to pay estimates for the various outcomes, based on estimates using ranking data. The first three cells are estimates of WTP to increase the three school-specific outcomes, $\{a_j\}_{j=1}^3$, by 5 percentage points. Students are willing to give up 41% in age 30 consumption to increase the chance of the school's teachings being consistent with their own ideology by 5 percentage point. The estimates also show that students need to be compensated by an increase of 2% in age 30 consumption to attend a school that is in a city different from their current location. Overall, these estimates are very large and imply that

students gain significant utility from each of these non-pecuniary outcomes, and that they are important drivers of school choice.

6.2.4 Advantage of Subjective Data on Non-pecuniary Outcomes

The previous subsection highlights how important non-pecuniary outcomes are in the decision process. To emphasize the advantage of subjective data for the non-pecuniary outcomes, we estimate the model by excluding the two most important outcomes (parents’ approval; alignment of the school’s teachings with one’s ideology). They are now subsumed in the ε_{is} term in equation (4). Estimation of this “restricted” model assumes that the random terms are independent for every individual and choice. Column (1) of Table A2 reports the estimates of this model. Estimates are qualitatively similar to those in the baseline model (reported in the first column of Table 7). However, estimates from the different models cannot really be compared since they are relative to the model-specific scale parameter. Instead, we report the choice elasticity based on the restricted model in column (2) of Table 9. We see that the choice elasticity estimates, while still inelastic, are 1.6 times larger than those based on the baseline model (column (1) of the table). This should not be surprising, because Table A1 shows that beliefs about the non-pecuniary outcomes are in fact positively correlated with earnings expectations. Since the non-pecuniary outcomes are now subsumed in the error term (which implicitly includes tastes), and estimation assumes that the error term is independent, the choice elasticity estimates are biased upwards. This shows that modelling assumptions which assume that tastes are orthogonal to the other elements of the model are likely to yield biased estimates, unless one accounts for non-pecuniary outcomes.¹⁹

6.2.5 Advantage of Subjective Data on Unemployment and Drop-out Uncertainty

Many existing work evaluating the role of future earnings on educational choices abstract from the uncertainty that may be associated with these earnings, in particular related to the risk of unemployment or dropping out. We evaluate in our context how our conclusions would change if we had not asked subjective beliefs about those outcomes, and assumed that students would graduate with probability 1 and find a job with probability 1. Equation (4) would become:

$$\max_{s \in S_i} \left\{ \sum_{j=1}^2 \alpha_j P_{is}(a^j) + \alpha_3 E_{is}(a^3) + \delta l_{is} + \theta \ln(y_{i0} - C_{is}) + \theta^* \ln(Y_{isg10}) + \gamma_s + \varepsilon_{is} \right\}$$

Column (2) of Table A2 reports the estimates and column (3) of Table 9 report the choice

¹⁹This can either be done by directly incorporating non-pecuniary outcomes in the model, as we do here, or by differencing out the tastes using exogenous changes in choices and expectations, say because of an information experiment, as in Wiswall and Zafar (2012).

elasticities of this model. We see that the choice elasticity estimates, while still inelastic, are 1.75 times larger than those based on the baseline model (column (1) of the table). This is because expected future earnings are higher if we ignore unemployment and drop-out uncertainty, so a 1-percent increase in earnings represents a larger increase compared to the case without uncertainty. Moreover, the WTP for teaching aligned with ideology and parental approval implied by the model ignoring drop-out and employment uncertainty are larger than the ones from the baseline model (column 2 of Table 10). This is because, when we ignore this uncertainty, many students (in particular from the Madrassas) seem to be choosing a school that has lower log earnings than other schools, resulting in an even larger utility weight for non-pecuniary outcomes.

6.2.6 Robustness checks

In this section we report a series of checks and validation showing the robustness of our results to various specifications and samples.

Estimation based on unconstrained stated choice Our baseline estimates are based on the preferred choice data in the case of the constrained choice set. However, as outlined in section 4.4, our survey instrument also asked students for their ranking in the case of the unconstrained choice set, in which case all five schools are in the respondent’s choice set. In Section 6.2.1, we have seen that the predicted school choice probabilities based on estimates from the constrained choice were very similar to the stated unconstrained choice. We now test whether estimates based on the stated unconstrained choice would yield similar WTP and elasticities as the one we obtained using the stated constrained choice. Since school costs are set to zero in the unconstrained case, the current period consumption ($y_{i0} - C_{is}$) does not vary across choices, and so the parameter θ is not identified. However, one advantage of using the unconstrained choice set is that all students have 5 schools in their choice set.²⁰ For all identified parameters, we should get estimates similar to those obtained from the constrained choice set. Column (3) of Table A2 shows the maximum likelihood estimates of (4) based on the preferred choice data in the unconstrained case. The estimates on the school-specific outcomes are qualitatively similar to those based on the constrained ranking data (reported in column (1) of Table 7). The model estimates imply an earnings choice elasticity of 0.121 (Column (4) of Table 9), compared to the elasticity estimate of 0.113 based on constrained choice. Column (3) of Table 10 also shows that the estimates yield WTP estimates strikingly similar to those derived from the constrained choice set. Overall, this provides again strong evidence in favor of both the model specification and the credibility of the data.

²⁰780 students have only one choice in their choice set in the constrained case, i.e. they state they can only afford the school they are currently in (72% of those are Madrassa students).

Ex-post Rationalization and Learning Since our sampling strategy is choice-based and students have been studying at their current school for a while, one concern may be that students' subjective beliefs are biased, say due to cognitive dissonance (Festinger, 1957), i.e. students may report beliefs that rationalize their choices. This would introduce systematic non-classical measurement error in beliefs, which would bias the model estimates. The patterns in the data, however, indicate that this bias is unlikely to be large. For example, a non-trivial proportion (25%) of students rank a school different from their current school as their most preferred choice under their current credit constraint, and 33% switch school from the constrained to the unconstrained case (Table 6). Similarly students seem to be aware of the different value-added of the institutions, as reported by a similar relative ranking of self earnings beliefs across respondents enrolled in different schools (the various columns in Table 3). Furthermore, previous research in the context of educational choices of US students has found little evidence of students tilting their beliefs about expected outcomes in favor of the options they had chosen (Zafar, 2011; Arcidiacono et al., 2012).

Another concern is that students have had the opportunity to learn about the institution they are currently enrolled. This would be problematic if we were using those revised beliefs to make inference on the institution they are currently attending, but in our application, we do not use the current institution as the choice for the estimation, rather we asked students their *current* school preferences, and estimate the choice model based on their *current* school preferences and *current* beliefs. As pointed out above, a non-trivial proportion of students rank a school different from their current school as their most preferred choice.

Yet, to address these potential concerns, we exploit the variation in students' duration of enrollment in their school. If ex-post rationalization of beliefs and learning is a concern, it is likely to be more serious for the group of students who have been attending an institution for a longer period. We compare the distribution of the various school-specific beliefs of students who are in their first year of attendance of their current institution (21% of the sample, see Table 1) with those who have been there longer, and find that they are generally similar (**results available upon request**). Columns (4) of Table A1 present estimates for the choice model based on choice data in which we interact all the variables with a dummy for being beyond the first year of attendance at the current institution. Outside of school location, none of the interacted terms are statistically significantly different from zero at conventional level, suggesting that we obtain preference estimates that are not statistically different for both groups. If the beliefs of one group was systematically biased, we would obtain different preferences estimates. Overall, this suggests endogeneity of beliefs is unlikely to be a serious concern in our data.

Uncertainty in Age 30 Earnings The model in equation (3) assumes that the only labor market earnings uncertainty is regarding the likelihood of finding a job, conditional on gradu-

ating and dropping out. Conditional on being employed, students are assumed to know their earnings with certainty. We now relax this assumption. Our survey elicited students subjective probability that their age 30 earnings conditional on working exceeds two thresholds, for the case of graduating and the case of dropping out of each of the school.²¹ We fit these two data points to an individual-specific beta distribution, and obtain the parameters of the 2-parameter beta distribution.²²

Table A3 presents the mean, median and standard deviations of the average and the standard deviation of the fitted beta distributions for each school and conditional on graduating or dropping out. There are two interesting features. First, the ordering of the school in terms of earnings is identical to that presented in Table 3 that shows the point estimates, though the averages of the fitted distribution tend to be larger than the point estimate on average (by about 10,000 Rs for the case of earnings conditional on graduating, less for the case of dropping-out). Second, students exhibit substantial uncertainty about their future earnings, as reflected by the large standard deviations of the beta distributions.

For our estimation, the term $\ln(Y_{ish10})$ where $h = \{g, d\}$ in equation (4) now becomes $E(\ln(Y_{ish10}))$. The beta distribution has a closed-form solution for this expectation, $E(\ln(Y_{ish10})) = [\psi(\alpha) - \psi(\alpha + \beta)](c - a) + a$, where ψ is the digamma function, $[a, c]$ is the support of the distribution,²³ and α and β are the parameters of the beta distribution (obtained from fitting the data points). Estimates based on the preferred choice data and using $E(\ln(Y_{ish10}))$ based on the fitted distribution instead of $\ln(Y_{ish10})$ based on the point estimates reported by the respondents, are presented in column (3) of Table 7. The estimates are almost identical to those obtained in the baseline model (column (1) of the table), suggesting that not accounting for earnings uncertainty does not bias our model estimates. This is because, despite the uncertainty faced by respondents,

²¹Specifically, regarding earnings conditional on graduating from the schools, students were asked: "*Consider the hypothetical situation where you graduate [drop out] from each of the institutions listed below. In the previous question, we asked you to think about your average monthly earnings at age 30 if you were working and if you were to graduate [drop out] from each of the institutions. However, for some people, it may be hard to predict how much they would earn at age 30. In this question, we ask you to think about the percent chance (or chances out 100) that your earnings at age 30 will be above certain thresholds if you are working.*

What do you think is the percent chance that your monthly earnings at age 30 will be above Rs. L1, if you graduated [dropped out] from "institution X"? And, What do you think is the percent chance that your monthly earnings at age 30 will be above Rs. L2, if you graduated [dropped out] from "institution X"?" L1 and L2 were the same for each of the school choices, but for meaningful variation in responses across and within individuals, they varied across the schools that the survey was conducted in. For students enrolled in Madrassas, L1 and L2 were set to Rs. 15,000 and Rs. 30,000, respectively. For VSU students, they were set to Rs. 25,000 and Rs. 75,000, respectively. And, for SU and U students, they were set to Rs. 20,000 and Rs. 50,000.

²²There are a total of 23,470 (2,347 respondents x 5 school choices x {graduate, drop out}) distributions to fit. We are unable to fit the data points in 4,625 (19.7%) of the cases. 1,071 cases are unfitted because the responses violate the monotonicity property of a cumulative distribution function, while in the remaining cases, the respondent assigns the same probability to the two thresholds. In these cases, we use the respondent's point estimate in the estimation (results are robust to dropping these observations). Overall, 16.1% of the students violate monotonicity at least once.

²³We set a to zero, and c to Rs. 200,000 for non-Madrassa students, and Rs. 100,000 for Madrassa students.

$E(\ln(Y_{ish10}))$ based on the fitted distribution and $\ln(Y_{ish10})$ based on the point estimates tend to be very close (see last two columns of Table A3). Column (5) of Table 9 and Column (4) of Table 10 also show that the choice elasticities and WTP based on these estimates are very similar to those obtained from the baseline model.

Allowing for Heterogeneity in Preferences for Future Consumption The baseline model in equation (4) does not allow for heterogeneity in preferences. However, if individuals have declining marginal utility of consumption, and preferences are separable in consumption and non-pecuniary outcomes, then the value of pecuniary outcomes will be higher for individuals from low-income households. Such heterogeneity, if not accounted for, may bias the model estimates presented so far.

To investigate this, we allow for heterogeneity in students' preference parameter age 30 consumption as follows. We assume that the utility parameter on age 30 consumption is given by $\theta^* = \theta_1^* + \theta_2^* \times 1(High\ Income)$, where $1(High\ Income)$ is a dummy that equals 1 if either of the respondent's parental income is above the sample median. From Table 1, we know that there is substantial heterogeneity across students. For example, 92% of VSU students have above-median income, compared to 16% of M students. If non-pecuniary outcomes are a normal good, an individual from a low-income family will value the income profiles associated with the schools more than other students will. That is, we expect the estimates of θ_2^* to be negative.

Column (4) of Table 7 presents the maximum likelihood estimates of this enriched model. Looking at the column (4) estimates, we see that the coefficients of the set of outcomes for which heterogeneity is not considered are almost identical to those in the baseline specification (reported in the first column of the table). The estimate of θ_1^* is positive and statistically very precise. The estimate of θ_2^* is negative as anticipated, statistically significant at 10% and of a magnitude of a third compared to θ_1^* . With this specification, we obtain choice elasticity and average WTP estimates that are nearly identical to those reported in the first column of Tables 9 and 10 (not shown). If we look at WTP by income group, we note that the WTP to increase ideology and parents' approval by 5 percentage point is about 10 percentage point higher in the high-income group.

Relaxing the IIA assumption The standard logit model exhibits IIA, which implies proportional substitution across alternatives. We next relax this assumption by estimating three additional models which do not rest on the IIA assumption: a multinomial probit model and two different nested models.²⁴ The estimates of the multinomial probit model (table A5) gen-

²⁴When we test for IIA using a Hausman-McFadden (1984) test, we do reject IIA. However, this test has been shown to have inadequate size property (Cheng and Long, 2007). Cheng and Long (2007) further report that, in a variety of substantive applications, commonly-used IIA tests often reject IIA when the alternatives seem distinct and that they do not reject IIA when the alternatives can reasonably be viewed as close substitutes, and that

erate similar WTP as the baseline estimates from the logit model, suggesting similar preference parameters based on the two models. Moreover, the elasticities with respect to earnings are also very similar (0.12% on average).

One particular concern may be that we have two Madrassas for whom students provide very similar expectations. We therefore next estimate a nested logit model with four nests: the first nest is Madrassa, which includes the two Madrassas in the two different cities, the second nest is Islamic University only, the third nest is Selective University only and the last nest is Very Selective University. Column (3) of Table A5 shows the results. Note that the WTP produced by the nested model are similar to those produced by the baseline model, suggesting again similar preference parameters based on the two models. Moreover, the elasticities are also very similar (0.108%)

Finally, because the two Western-style universities share common characteristics (such as similar curriculum and gender-mixed campuses), we also estimate a nested logit model with 3 nests: the first nest is Madrassa, which includes the two Madrassas in the two different cities, the second nest is Islamic University only, the third nest is Selective University and Very Selective University. The WTP produced by this nested model (Column (6) of Table A5) are again similar to those produced by the baseline model. Moreover, the elasticities are also very similar (0.109% on average).

7 Policy Experiments

In this section, we use the estimated preferences parameters (from Table 7, column (1)) to evaluate the implications of three types of policy: one that relaxes financial constraints, another that disseminates information about the objective returns to school types, and a third that entails a reform of the curriculum taught in Madrassa. We investigate how they influence school enrollment and welfare of the students. The first column of Table 11 shows the proportion choosing each of the five schools in the constrained case, which is our benchmark. In order to compute the possible welfare gains of instituting a policy, we compute the difference in the utility gained from the school chosen in the policy experiment ($s_i^{*u} = \arg \max_{s \in S_i^p} U_{is}$, where S_i^p is i 's feasible choice set under policy p), and the school chosen in the constrained case ($s_i^{*c} = \arg \max_{s \in S_i} U_{is}$). We report both the percentage increase in utility, and the age 30 earnings that would generate a similar increase in utility for someone with average characteristics and age 30 earnings. Our simulations are made under the assumption that the only schools available are the ones we consider in the hypothetical choice scenarios, the distribution of students across the schools is the one we have in our sample and that all students can gain admissions to all schools.

they are therefore not appropriate to test for IIA.

7.1 Relaxing Financial Constraints

Columns (2) - (5) report students' choices (in Panel A) and welfare gains (in Panel B) for 3 different policy experiments that relax credit constraints to varying extents. Column (2) reports estimates based on a policy where students have the option to borrow to finance their school costs at 3% and repay the loan over a 40-year period when they are working; column (3) reports estimates based on a free schooling policy funded by income tax paid by the students over a 40-year period when they are working and earn more than Rs 20,000 per year;²⁵ and column (4) reports estimates where students from lower-income households (below-median sample household income) are given a tuition subsidy equivalent to IU's tuition (more precisely, the sample perceived average of IU's tuition) that are paid out of tax by all students during their working lives and when they earn more than Rs 20,000 per year.²⁶

A policy that provides student loans to finance schooling (column (3)) yields to very different enrollment and large welfare gains. Enrollment at the Very Selective University more than double, while enrollment at the Selective University halves. Enrollment at the three remaining schools decreases slightly. It is interesting to note that those enrollment are very similar to those stated by the students in the unconstrained case (presented in Column (4) of Table 8). When students loan are available, 37% of the students would choose a different school compared to the constrained case. Table A5 shows the transitions of schools chosen by the students under the loan policy according to the school they would be under the constrained case. About 73% of the Madrassa would still remain at a Madrassas, even if credit constraints were lifted. 12% would go to IU and the same proportion would go to the Very Selective University. With student loan available, the big "switchers" are the students from the Selective University (69% of whom would switch to the Very Selective University) followed by the Islamic University students (38% of whom would switch to the Very Selective University). Panel B shows that this policy, relative to the baseline constrained case, leads to an average life-time utility gain of 20.6% (and a median gain of 8.9%). Converting this utility gain into rupee amounts yields an average utility gain equivalent to an increase of about Rs. 5,700 in annual age 30 earnings.

Note that there may be psychological cost entailed by taking a loan, especially in this context where charging interest is forbidden by Islamic law. Such a loan could be re-labeled as a tax on labor earnings for students. So we next investigate a policy that provides free schooling paid out of tax while working (column (3)). This policy again yields similar enrollment and welfare gains

²⁵This is similar to student loan in the UK, for which students make repayment only if their income is above a given threshold.

²⁶For the policy experiments outside of column (4), credit constraints are entirely eliminated, and hence S_i^p includes all 5 schools. To determine the set of feasible schools for experiments in columns (4), we use information on the maximum amount that the individual's family can pay to finance college. Students were asked: "*What is the maximum monthly expenses (including tuition, room and board) that you and your family would be able to pay for you to be enrolled in school without any external financial aid?*". Schools, whose tuition does not exceed this amount plus the potential subsidy in the experiment, are in the individual's choice set.

than the free schooling case. About 9% of the students would be made worse off by this tax but the mean life-time utility gain is still above 20%.

A subsidy provided to lower-income students (column (4)) would increase enrollment at the Very Selective University by about 6 percentage point. Enrollment at the Selective University and the Madrassa would reduce slightly. If we look at the transitions from table A5, we note that the behavior of the Madrassa is quite similar to the ones under a loan policy: this is because most of the Madrassa students would receive the subsidy but note that the switch to the Very Selective University would be only at 7% because the subsidy does not cover its full cost, making it outside of the choice set of some who would like to switch. About 8% of the students from the Selective University would switch to the Very Selective University, compared to 15% of the Islamic University students. While smaller than the gains under free schooling, the average lifetime utility gain for this policy is still 12.3%. About a quarter of the students would however be worse off under this policy.

All the experiments above assume that each school can increase its capacity based on the students' demand, which is a strong assumption. We now relax this by conducting two additional experiments. The first one is free schooling paid out of tax (similar to column (3)) under the assumption that Very Selective University can only increase costlessly its capacity by 20%. The second one assumes the construction of another Very Selective University, at a cost of USD 60 Millions paid out of tax, combined with free schooling paid out of tax (similar to column (3)). This amount is the cost of a newly state of the art University, Habib University, constructed in Karachi, Pakistan, scheduled to open in the Fall 2014 and partnering with Texas A&M.²⁷

Table 11, column (5), shows that, under the 20% capacity constraint, Very Selective University would increase enrollment until full capacity and that average lifetime utility gain would be 13.4%. The construction of a new Very Selective University yields enrollment and average lifetime gains that are very similar to the free schooling paid out of tax policy (column (6) of Table 11). However, more people (16%) would be made worse-off. This is because of the higher tax rate implied by this policy.

These experiments reveal substantial utility gains as a result of relaxing financial constraints. The largest gains come from policies that either provide free schooling financed out of tax or facilitate the provision of student loans.

7.2 Providing Earnings Information

Given a large literature that shows that students may be misinformed about the returns to schooling and that providing objective information about returns may impact choices (Jensen,

²⁷Source: [http://www.nation.com.pk/karachi/17-Feb-2013/habib-university-to-begin-operations-in-fall-of-](http://www.nation.com.pk/karachi/17-Feb-2013/habib-university-to-begin-operations-in-fall-of-2014)

2010; Nguyen, 2010; Betts, 1996; Wiswall and Zafar, 2012), we next investigate whether such information dissemination has an impact in our context. If students' self earnings beliefs are based, in part, on their perceived population beliefs, and their population beliefs are inaccurate, then such an intervention can have large effects. We implement this policy as follows: we assume the median student's population earnings beliefs $Y_{pop, sh10}^{Median}$ (that is, beliefs about age 30 earnings of an average graduate or drop-out of each of the various schools, reported in Table 2) is an unbiased estimator of the true average population beliefs. Given the statistics in Table 2, and how close those medians are from the earnings reported by the school administrators (column 7), this is a reasonable assumption. We then purge each student's self beliefs of the forecast error in their self population beliefs, such that $Y_{ish10}^* = Y_{ish10} \frac{Y_{pop, sh10}^{Median}}{Y_{pop, ish10}}$.²⁸ Y_{ish10}^* is then individual i 's beliefs about own age 30 earnings if he had information about the true population earnings. We plug in Y_{ish10}^* instead of Y_{ish10} in equation (4), and use the model estimates in column (1) of Table 7, to determine the school that yields the highest expected utility for the individual. To compute the welfare gain, we also use those earnings for the case of the constrained case.

Column (7) of Table 11 reports the results based on this policy experiment. We see that the proportion of students choosing each of the schools are identical to those in the first column and average utility gain is 4.4%. The limited change in enrollment may be the result of the inability of students to move due to financial constraint, even though they would want to do so now they have more information. We therefore combine in the column (8) of Table 11 a policy where students are provided with both schooling subsidy paid out of tax (as in column 3) and with information about returns to schooling. However, school enrollment is again nearly identical to those under school subsidy shown in column (3) and the average utility gain is also similar to the one based on the school subsidy only. Overall, this suggests that providing information on earnings does not have a large impact on students' school choices.

This results may be at first surprising, given that students have substantial heterogeneity in beliefs. However, there are two main factors driving them. First, as seen in Section 5.2.2, choice elasticities with respect to earnings are quite small. Second, most students perceived accurately the ranking of schools in terms of earnings (60% believe that they would earn more when graduating from Islamic University than from a Madrassa, and more from VSU than from graduating of SU or IU). Since the relative earnings are important for school choice, the additional information provided by the policy had little impact on final outcomes. Hence, in this sample of students motivated enough to pursue a bachelors-equivalent degree, only limited gains can be achieved from an intervention that disseminates information about objective returns.

²⁸We skip the derivation steps here. Interested readers are instead referred to Arcidiacono et al. (2011), who implement a similar policy experiment.

7.3 Reforming the Madrassa curriculum

Madrassas have received considerable attention recently, especially since 9/11. Despite scant research, claims made by policy makers and in the popular press suggest that they may be responsible for fostering militancy, Islamic extremism, international terrorism and violence. As a result, the US has been encouraging Madrassa reform in the Muslim world, especially in Pakistan where Madrassas are thought to be linked to the Taliban (The 9/11 Commission, 2004; Fair, 2008). As explained in Section 3.1, the majority of Madrassas do not impart any secular or vocational training. A reform program aiming at introducing secular subjects into the madrassa curriculum was launched, with US support, by the Government of Pakistan in 2002. However, it has failed to win support from most Madrassas. By 2008, fewer than 300 of the 16,000 registered madrassas were estimated to have joined the reform program (Bano, 2007). Moreover, in a survey conducted by Ahmad (2009), 91.5% of Madrassa teachers and 77.1% students agreed with the statement that the present system of Madrassa education in Pakistan is adequate and does not need any changes. However, the reform is generally well-perceived in the general population. In a survey we conducted in the two cities of our study site, 60% of the respondents fully support for the government's plan to reform Madrassas that would require them to include secular subjects in the curriculum.²⁹ This sentiment is similar to that found in Fair, Ramsay, and Kull (2008), where two-thirds of their sample reportedly supports Madrassa reform. We investigate how such a reform could potentially influence Madrassa enrollments among students currently pursuing Bachelor degree. The thought experiment is that the reform would make the expected earnings and probability of employment of Madrassa graduates equal to those of Islamic University graduates. So we replace every student's beliefs about earnings and employment conditional on graduating or dropping out from a Madrassa with those conditional on graduating or dropping out from Islamic University. The results are presented in the last column of Table 11. It has very limited impact on enrollment which looks very similar to those of the constrained case. We could have expected some switch among IU or SU students, because their expected log earning is similar at both places on average (see Table 4) while the expected cost at the Madrassas are thought to be quite lower by these two groups of students (Table 5). However, the lower cost does not seem to compensate the ideology and parental approval components, both of which are quite lower at a Madrassa than at their current school. Such a reform could however prompt young people who have decided not to pursue tertiary education to enroll in a Madrassa, something we cannot investigate with our data.

²⁹ Respondents were asked whether they support the plan to reform the Madrassas, requiring Madrassas to register with the government and to spend more time in class on subjects like math and science on a scale from 0 to 10, where 0 means absolutely oppose and 10 means absolutely favor. 60% of the respondents reported 10, and 78% reported 8 or more.

8 Conclusion

The choice of a higher education institution plays a major role in determining the employability and earnings of university students. This paper investigates the role of expected monetary returns, non-pecuniary factors enjoyed at school, and financial constraints in the choice of higher education, in the context of urban Pakistan. Such a context is relevant given the soaring demand for higher education in many developing countries, and the large spectrum of institutions, in terms of quality, cost and religious affiliations, that students face in those countries. We find that financial constraints are important in determining students' choice and that lifting those by introducing policies such as student loans would increase average lifetime utility by 21% and lead more than a third of the students to choose another institution. We also find that non-monetary outcomes enjoyed at school play a very large role in students' choice. While future earnings matter to students, their role is only marginal.

The approach of this paper illustrates the potential for using a rich set of subjective expectations in choice models. Without those expectations data, one would have to rely on (non-credible) assumptions to make inference on preferences. Moreover, our findings based on the use of these expectations data reveal that ignoring some of the uncertainty that students face (e.g., regarding unemployment and drop-out), and ignoring non-pecuniary factors, would bias the estimates of the preference parameters and the choice elasticities with respect to earnings. This suggests that those should be taken into consideration when trying to understand educational choices. The richness of our data also allow us to conduct an out-of-sample-type validation of our model, strengthening the credibility of our findings.

Our results have important policy implications for the design of programs aiming at improving students' human capital and their future labor market prospects. Relatively inexpensive policies such as students loan or subsidy paid out of tax (by the students) would have large positive implication on students' welfare. A drawback of our study is that our sample is restricted to university students. We cannot therefore conclude how participation in higher education would change based on those policies. We speculate, given the large effect relaxing financial constraint has in our sample, that the welfare gains are likely to extend beyond university students because the availability of student loans policy or university tuition subsidy may also increase overall participation to higher education. In our context, we also find that providing information on earnings would have a limited impact on enrollment and welfare. However, our results should not be interpreted as implying that there are generally few gains from information campaigns that disseminate information on school returns in a country like Pakistan with low higher educational enrollment. Our results simply suggest that those information campaigns should be targeted to populations where misinformation is likely to be prevalent.

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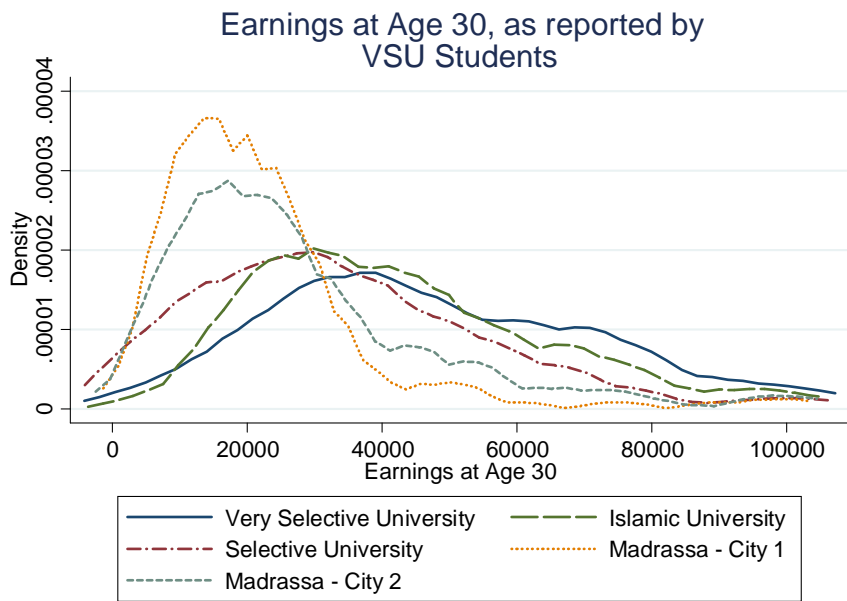


Figure 1: Earnings distribution of VSU students, conditional on graduating from each of the five schools.

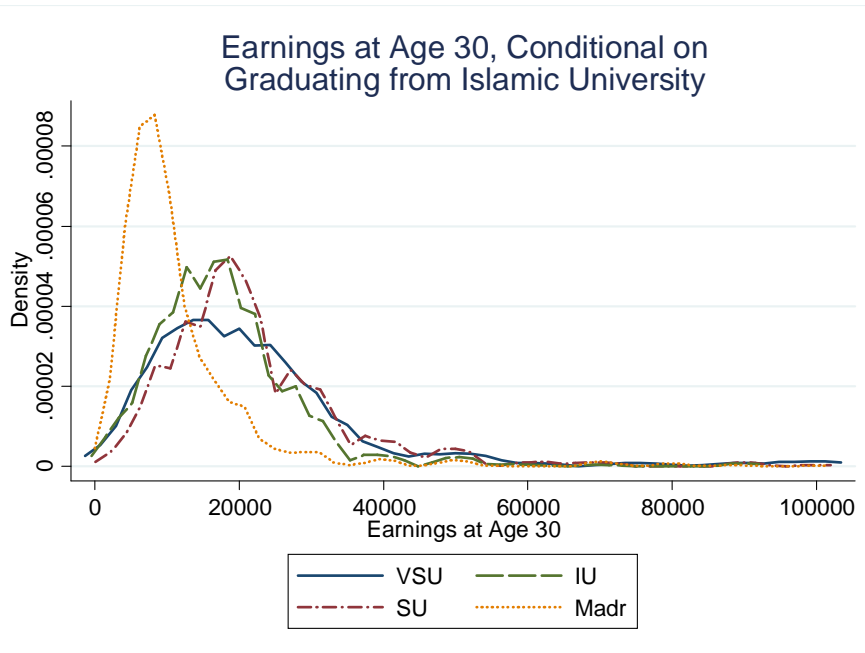


Figure 2: Earnings distribution conditional on graduating from Islamic University, as reported by students in the four school types.

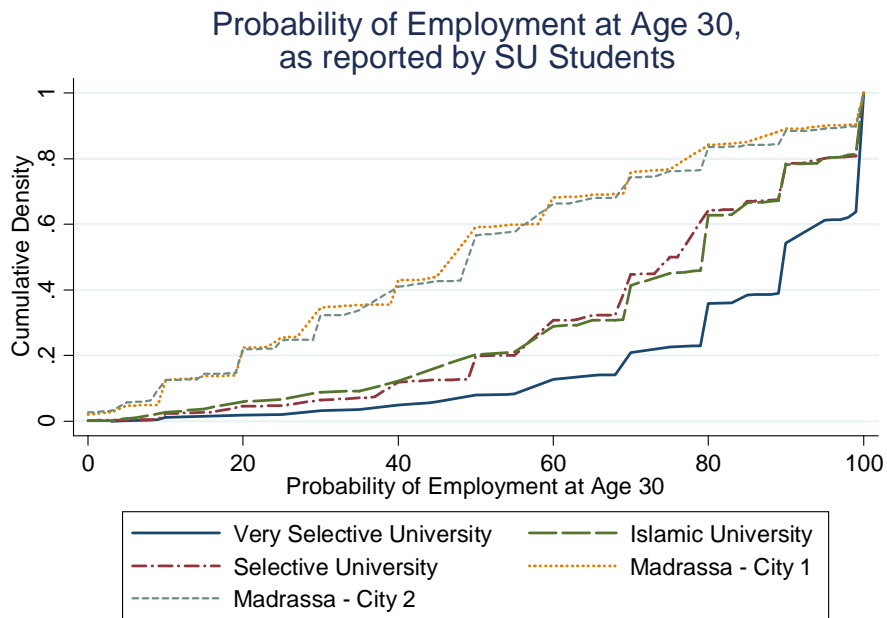


Figure 3: SU students' belief distribution of being employed at age 30, conditional on graduating from each of the five school choices.

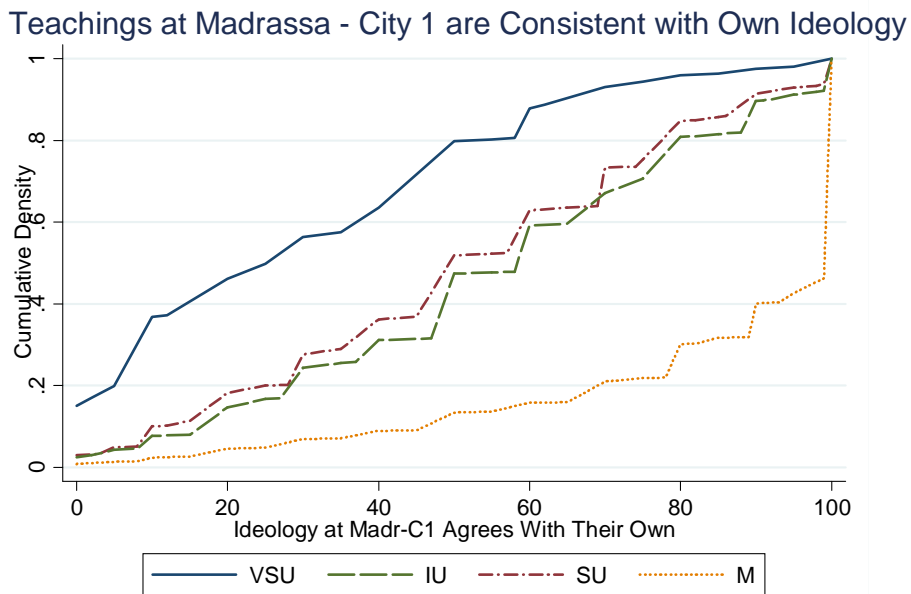


Figure 4: Students' belief distribution of teachings at Madrassa-City1 being consistent with own ideology.

Table 1: Sample Characteristics

	All	VSU	SU	IU	M	F-test ^a
	(1)	(2)	(3)	(4)	(5)	(6)
Number of respondents	2347	247	511	444	1145	
Age	21.9 (2.9)	20.7 (3.7)	21.6 (2.3)	21.9 (2.5)	22.2 (3.0)	0.000
Father's years of education	9.5 (5.5)	14.4 (1.9)	10.9 (5.9)	11.4 (4.2)	7.1 (5.0)	0.000
Mother's years of education	6.8 (5.8)	12.8 (3.0)	11.0 (4.9)	7.1 (5.1)	3.4 (4.4)	0.000
Parents' monthly income (in 1000s Rs)	58.6 (123.6)	186.9 (228.1)	97.3 (146.8)	41.9 (52.2)	19.8 (59.7)	0.000
Number of siblings (including self)	3.9 (2.2)	2.7 (1.4)	4.0 (2.1)	4.5 (2.3)	.	0.000
% Parents own:						
home	84.2	91.5	86.9	81.5	82.5	0.001
television	57.3	89.9	83.4	79.3	29.9	0.000
cellphone	77.9	90.3	80.0	79.5	73.6	0.000
computer	47.6	82.6	70.1	59.5	25.1	0.000
car	36.1	81.8	67.1	40.8	10.4	0.000
Religiosity (0-10) ^b	7.5 (2.4)	5.3 (1.6)	5.9 (1.9)	6.3 (1.7)	9.2 (1.6)	0.000
Attended private school before University	35.8	74.9	69.1	41.9	10.1	0.000
Percentage of first-year students	21.0	69.2	30.1	34.9	1.1	0.000
% with above median income	45.0	92.3	80.6	53.2	15.8	0.000
Proportion of expenses coming from:						
parents & family	0.795 (0.276)	0.846 (0.312)	0.832 (0.238)	0.783 (0.283)	0.778 (0.286)	0.006
loans/aid which must be repaid	0.064 (0.147)	0.020 (0.074)	0.056 (0.156)	0.064 (0.157)	0.071 (0.142)	0.038
grants/aid which need not be repaid	0.056 (0.137)	0.070 (0.230)	0.039 (0.102)	0.080 (0.173)	0.054 (0.126)	0.001
personal savings and earnings	0.085 (0.183)	0.065 (0.227)	0.073 (0.145)	0.073 (0.159)	0.096 (0.202)	0.078

Table reports the mean of the continuous variables, with standard deviations in parentheses.

^a p-value of a F-test for equality of the means of the row variable across the four institutions (that is, columns (2)-(5)).

^b Self-reported religiosity on a scale of zero (not religious at all) to 10 (very religious).

^c Self-reported risk preference on a scale of zero (totally unwilling to take risk) to 10 (fully prepared to take risks).

Table 2: Population Beliefs - Perceived Age 30 Monthly Earnings of Gradautes of Different School Types

All	VSU	SU	IU	M	Other Schools ^a	Obj. Value ^b	F-test ^c	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Beliefs about age 30 earnings of male graduates of (in 1,000 rupees):								
Very Selective University	46.0 [40] (47.9)	43.3 [38] (33.5)	70.0 [60] (73.1)	59.9 [50] (37.0)	30.3 [25] (31.1)	46.3 [40] (49.3)	38.8 [41.3] (10.9)	0.000
Selective University	36.2 [30] (49.1)	39.9 [35] (25.1)	45.9 [35] (75.4)	42.0 [40] (29.9)	28.8 [20] (42.5)	33.5*** [30] (38.2)	30.9 [30.3] (11.2)	0.000
Islamic University	34.6 [30] (44.3)	35.0 [30] (21.7)	47.1 [35] (68.7)	43.2 [40] (24.2)	25.5 [20] (37.5)	32.5*** [25] (47.6)	26.0 [25.0] (3.6)	0.000
Madrassa-City1	17.6 [15] (22.8)	30.3 [23] (23.6)	22.0 [20] (20.3)	18.0 [16] (10.6)	12.8 [10] (25.5)	22.2*** [20] (18.7)	9.4 [8.8] (1.8)	0.000
Madrassa-City2	17.8 [15] (17.2)	29.4 [25] (21.3)	22.0 [20] (15.3)	18.6 [18] (11.7)	13.1 [10] (17.1)	22.3*** [20] (16.1)	15.0 [15.0] (4.1)	0.000
Number of respondents	2347	247	511	444	1145	-	-	
Response rate ^d	99.4	99.2	100	99.5	99.2			
F-test ^e	0.000	0.000	0.000	0.000	0.000	0.000		

Standard deviations reported in parentheses, and median in squared brackets.

***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

^a "Other schools" is the set of schools excluding the school about which beliefs are being reported. The column also reports a pairwise t-test of the equality of the mean average population earnings for students in the "other schools" group and students in the school about which the population beliefs are being reported. For example, in the first row, "Other schools" includes SU, IU, and M students, and the test of equality is for the mean of "Other schools" and "VSU".

^b Objective value refers to the survey responses of the administrators of the institutions.

^c p-value of a F-test for equality of the means of the row variable across the four institutions (that is, columns (2)-(5)).

^d Percent of responses with non-missing data for ALL variables in the table.

^e p-value of a F-test for equality of the means of earnings associated with the different school types, as reported by students within an institution (the column).

Table 3: Age 30 Self Monthly Earnings Beliefs

	All	VSU	SU	IU	M	Other ^a	F-test ^b
	(1)	(2)	(3)	(4)	(5)	(6)	(8)
Panel A: Beliefs about own age 30 earnings Graduating:							
Very Selective U	46.2 [40] (36.2)	52.1 [45] (31.5)	68.1 [60] (40.4)	60.8 [50] (35.9)	29.3 [25] (25.6)	45.5*** [40] (36.7)	0.000
Selective U	32.8 [30] (21.9)	34.2 [30] (22.3)	42.0 [35] (21.4)	39.6 [35] (20.9)	25.6 [20] (19.9)	30.2*** [25] (21.4)	0.000
Islamic U	33.7 [30] (24.5)	45.5 [40] (26.3)	40.6 [35] (23.4)	44.1 [40] (24.2)	24.1 [20] (20.7)	31.3*** [25] (23.9)	0.000
Madrassa-City1	15.5 [12] (11.4)	20.3 [20] (12.2)	21.4 [20] (11.3)	17.5 [15] (9.5)	11.0 [9] (10.1)	19.8*** [20] (11.0)	0.000
Madrassa-City2	17.0 [15] (13.8)	27.6 [20] (20.1)	21.6 [20] (12.6)	18.9 [18] (11.4)	12.1 [10] (11.1)	21.8*** [20] (14.4)	0.000
Response rate ^c	97.3	93.9	97.7	98.0	96.3	-	
F-test ^d	0.000	0.000	0.000	0.000	0.000	0.000	
Panel B: Beliefs about own age 30 earnings Drop-out:							
Very Selective U	24.7 [20] (29.0)	33.1 [28] (23.2)	35.3 [30] (38.3)	28.5 [25] (20.2)	16.8 [11] (25.6)	23.8*** [18] (29.4)	0.000
Selective U	20.1 [15] (24.4)	28.6 [25] (19.3)	25.1 [20] (27.9)	20.4 [20] (12.8)	15.9 [10] (26.2)	18.7*** [15] (23.2)	0.000
Islamic U	21.4 [15] (46.0)	24.2 [20] (20.7)	26.0 [20] (37.6)	24.9 [20] (49.6)	17.3 [10] (51.2)	20.5* [15] (45.1)	0.001
Madrassa-City1	12.9 [10] (24.4)	19.6 [10] (21.6)	16.5 [10] (23.8)	10.9 [10] (8.4)	10.6 [7] (28.7)	15.1*** [10] (19.4)	0.000
Madrassa-City2	13.1 [10] (18.7)	20.9 [15] (22.2)	15.5 [10] (21.7)	11.4 [10] (10.3)	11.2 [8] (18.5)	15.1*** [10] (18.8)	0.000
Response rate	99.5	98.0	100	99.3	99.6		
F-test	0.000	0.000	0.000	0.000	0.000	0.000	
# of respondents	2347	247	511	444	1145	-	

Standard deviation reported in parentheses and median in squared brackets.

***, **, * denote significance level at the 1%, 5%, and 10% levels, respectively.

^a "Other schools" is the set of schools excluding the school about which beliefs are being reported. The column also reports a pairwise ttest of the equality of the mean earnings for students in the "other schools" group and students in the school about which self beliefs are being reported. For example, in the first row, "Other schools" includes SU, IU, and M students, and the test of equality is for the mean of "Other schools" and "VSU".

at the 1%, 5%, and 10% levels, respectively.

^b p-value of a F-test for equality of the means of the row variable across the four schools (columns (2)-(5)).

^c Percent of respondents with non-missing data for ALL variables in that panel.

^d p-value of a F-test for equality of the means of earnings associated with the different school types, as reported by students within a school (the column).

Table 4: Beliefs about Labor Market-related Outcomes, across School Choices

	All	VSU	SU	IU	M	Other ^a	Obj. Value ^b	F-test ^c
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Prob. of completing degree:								
Very Selective University	58.5	78.0	76.4	73.4	40.4	56.2***	95.0	0
Selective University	58.2	57.8	82.9	71.6	42.0	51.3***	75.3	0
Islamic University	68.1	48.2	75.9	88.0	61.1	63.5***	87.7	0
Madrassa-City1	69.4	40.5	66.2	64.2	79.0	60.3***	61.3	0
Madrassa-City2	71.3	35.5	67.3	63.1	83.8	59.3***	83.3	0
Response rate	0.994	0.984	1	0.994	0.994			
F-test ^d	0	0	0	0	0	0		
Prob. of having a job at age 30 graduate:								
Very Selective University	69.4	74.4	89.5	85.4	53.1	68.8***	68.3	0
Selective University	63.4	63.2	77.2	73.3	53.3	59.5***	88.5	0
Islamic University	69.3	53.7	76.1	80.1	65.3	66.7***	96.7	0
Madrassa-City1	63.6	36.1	55.8	51.3	77.8	50.1***	92.5	0
Madrassa-City2	65.8	38.4	56.3	52.1	81.3	51.1***	88.8	0
Response rate	0.997	0.997	1	1	0.995			
F-test	0	0	0	0	0	0		
Prob. of having a job at age 30 dropout:								
Very Selective University	48.0	47.2	57.6	48.7	43.5	48.1		0
Selective University	43.3	41.6	46.5	39.5	43.7	42.4***		.001
Islamic University	46.4	35.3	45.0	45.6	49.7	46.6		0
Madrassa-City1	45.7	29.6	35.7	32.9	58.5	33.4***		0
Madrassa-City2	47.5	30.6	35.9	33.6	61.8	34.0***		0
Response rate	0.997	0.991	1	0.998	0.997			
F-test	0	0	0	0	0	0		
Age 30 expected log earnings:								
Very Selective University	8.2	9.2	11.1	10.1	5.9	8.1***		0
Selective University	7.3	7.0	9.6	8.3	5.9	6.7***		0
Islamic University	8.1	5.9	9.0	9.9	7.5	7.7***		0
Madrassa-City1	7.1	4.1	6.2	5.6	8.7	5.6***		0
Madrassa-City2	7.4	4.4	6.3	5.7	9.2	5.7***		0
Response rate	0.971	0.942	0.996	0.977	0.964			
F-test	0	0	0	0	0	0		
Num of respondents	2347	247	511	444	1145			

Table reports the mean statistics.

^a "Other schools" is the set of students in schools excluding students in the school being asked about. The column also reports a t-test of the equality of the mean for students in the "other schools" group and students in the school which is being asked about. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

^b Objective value refers to the survey responses of the administrators of the school.

^c p-value of a t-test for equality of the mean of the row variable across the four schools (col (2)-(5)).

^d p-value of a t-test for equality of mean of the variable across the different choices, within a school.

Table 5: Beliefs about Various School-related Outcomes, across School Choices

	All	VSU	SU	IU	M	Other ^a	Obj. Value ^b	F-test ^c
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Prob. of teachings consistent with ideology:								
Very Selective University	52.5	72.2	69.3	66.8	35.2	50.2***		0
Selective University	50.8	59.0	68.0	60.6	37.4	46.0***		0
Islamic University	64.2	47.1	66.1	76.8	62.1	61.3***		0
Madrassa-City1	67.3	32.0	53.4	56.9	85.2	50.3***		0
Madrassa-City2	68.7	31.6	54.4	56.4	87.9	50.5***		0
Response rate	0.999	1	1	0.999	0.998			
F-test	0	0	0	0	0	0		
Prob. of Parents' approval for:								
Very Selective University	59.4	77.1	81.5	74.9	39.5	57.3***		0
Selective University	57.2	62.7	81.5	67.0	41.3	50.4***		0
Islamic University	68.5	51.0	69.3	88.6	64.0	63.8***		0
Madrassa-City1	64.0	27.8	48.4	49.8	84.3	44.7***		0
Madrassa-City2	67.0	32.1	52.1	48.3	88.5	46.6***		0
Response rate	0.998	1	1	1	0.996			
F-test	0	0	0	0	0	0		
Graduation rank for:								
Selective University	68.0	66.9	66.3	70.2	68.1	68.1		0.19
University	70.1	63.0	75.2	72.3	68.5	68.7***		0
Islamic University	76.1	66.0	73.4	81.0	77.5	74.9***		0
Madrassa-City1	74.4	55.1	67.2	67.1	84.7	64.7***		0
Madrassa-City2	74.6	55.0	67.8	66.8	84.9	64.8***		0
Response rate	0.998	1	1	1	0.996			
F-test	0	0	0	0	0	0		
Average Monthly expenses (in 1,000 rupess) for:								
Very Selective University	27.1	42.0	35.7	25.5	20.6	25.4***	15.5	0
Selective University	20.1	36.6	21.0	17.4	17.4	19.9	18.4	0
Islamic University	16.6	30.0	21.5	12.7	13.1	17.5***	9.3	0
Madrassa-City1	7.5	16.1	12.8	6.6	3.8	11.1***	1.6	0
Madrassa-City2	7.2	16.0	10.4	7.5	3.8	10.4***	1.7	0
Response rate	0.973	0.935	0.986	0.986	0.97			
F-test	0	0	0	0	0	0		
Num of respondents	2347	247	511	444	1145			

Table reports the mean statistics.

^a "Other schools" is the set of students in schools excluding students in the school being asked about. The column also reports a t-test of the equality of the mean for students in the "other schools" group and students in the school which is being asked about. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

^b Objective value refers to the survey responses of the administrators of the school.

^c p-value of a t-test for equality of the mean of the row variable across the four schools (col (2)-(5)).

^d p-value of a t-test for equality of mean of the variable across the different choices, within a school.

Table 6: Ranking of Schools and Credit Constraints

	All	VSU	SU	IU	M	Other ^a	p-value ^b
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: With School Costs							
<i>Proportion who can afford:</i>							
Very Selective University	.41	1	.44	.39	.29	.35***	0.000
Selective University	.54	.61	1	.57	.3	.41***	0.000
Islamic University	.59	.68	.67	1	.37	.49***	0.000
Madrassa-City1	.84	.83	.84	.88	.83	.85	0.085
Madrassa-City2	.87	.85	.87	.85	.88	.86	0.257
Chi-square test ^c	0	0	0	0	0	0	
<i>Proportion who rank school the highest:</i>							
Very Selective University	.15	.89	.19	.083	.0009	.063***	0.000
Selective University	.12	.026	.47	.069	.0009	.021***	0.000
Islamic University	.19	.022	.18	.72	.014	.058***	0.000
Madrassa-City1	.24	.039	.076	.087	.41	.073***	0.000
Madrassa-City2	.31	.022	.094	.041	.57	.06***	0.000
Chi-square test	0	0	0	0	0	0	
<i>Number of schools ranked:</i>							
Mean	2.6	3.6	3.2	3	2	-	0.000 ^d
Median	[2]	[4]	[4]	[3]	[2]	-	
Standard deviation	(1.3)	(1.5)	(1.4)	(1.2)	(1)	-	
<i>Proportion who switch highest-ranked school from current school:</i>							
	.25	.11	.53	.28	.13		0.000
Panel B: No School Costs							
<i>Proportion who rank school the highest no school costs</i>							
Very Selective University	.36 ⁺	.80 ⁺	.74 ⁺	.58 ⁺	.017 ⁺	.31*** ⁺	0.000
Selective University	.041 ⁺	.081 ⁺	.087 ⁺	.045 ⁺	.0097 ⁺	.028*** ⁺	0.000
Islamic University	.15 ⁺	.047 ⁺	.097 ⁺	.31 ⁺	.12 ⁺	.11*** ⁺	0.000
Madrassa-City1	.20 ⁺	.030 ⁺	.046 ⁺	.054 ⁺	.37 ⁺	.046*** ⁺	0.000
Madrassa-City2	.25 ⁺	.038	.032 ⁺	.011 ⁺	.48 ⁺	.025*** ⁺	0.000
Chi-square test	0	0	0	0	0	0	
<i>Proportion who switch highest-ranked school from Panel A to Panel B:</i>							
	.38	.21	.63	.56	.23	-	0.000
Number of students							
	2347	247	511	444	1145		

***, **, * denote significance at 1%, 5%, and 10% levels, respectively

^a p-value of Chi-square test of equality of the proportions for students in the "other schools" group (set of students not in the school which is being asked about) vs student in that school.

^b p-value of Chi-square test for equality of the proportion of the row variable across the four schools.

^c p-value of a Chi-square test for equality of the proportions across the different school choices, within a school

^d p-value of a t-test for equality of the mean number of schools ranked by students across the four schools. The table also reports a Chi-square test for the equality of proportions who rank a school highest conditional on no school costs, and the proportion who rank the school highest conditional on costs. + denotes sign. at 1%.

Table 7: Maximum Likelihood Estimates based on Constrained Choice Set

	Choice Data (1)	Ranking Data (2)	Uncertainty in earnings (3)	Heterogeneity in preference (4)
Teachings aligned with ideology	2.571*** (0.350)	2.721*** (0.212)	2.575*** (0.349)	2.594*** (0.350)
Parents' approve of choice	2.184*** (0.288)	2.368*** (0.186)	2.180*** (0.286)	2.183*** (0.288)
Graduation Rank	-0.153 (0.329)	0.413** (0.203)	-0.117 (0.324)	-0.155 (0.328)
Distance from current town ^a	-0.905*** (0.0799)	-0.439*** (0.0469)	-0.900*** (0.0796)	-0.905*** (0.080)
ln(Current period consumption)	0.0078 (0.013)	0.0143* (0.00843)	2.456 (6.073)	0.010 (0.013)
Age 30 expected ln(earning)	0.247*** (0.027)	0.203*** (0.017)	0.257*** (0.029)	0.306*** (0.042)
Age 30 expected ln(earning) × 1(Parent Income Above Median)				-0.100* (0.052)
Number of Choice Scenarios	2182	5207	2182	2182
Number of students	2182	2280	2182	2182

Maximum likelihood estimates. Standard errors in parentheses.

***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

Ideology and parents' approve are elicited on a 0-100 scale, and normalized to 0-1.

Graduation rank is on a 1-100 scale (normalized to 0.01-1).

^a Dummy that equals 1 if the schools is in a town different from the respondent's current location.

Table 8: Model Fit

	Stated Constrained Choice	Predicted constrained choice		Stated Unconst. Choice	Predicted choice with free schooling	
	(1)	Choice Data ^a	Ranking Data ^b	(4)	Choice Data ^a	Ranking data Data ^b
		(2)	(3)	(4)	(5)	(6)
Probability of choice						
Very Selective Uni	17.82%	18.43%	15.29%	35.85%	37.22%	28.09%
Selective University	10.72%	12.90%	14.25%	4.51%	6.34%	9.96%
Islamic University	19.03%	16.64%	18.47%	14.75%	15.35%	19.72%
Madrassa-City1	24.01%	21.82%	21.30%	20.14%	18.24%	18.04%
Madrassa-City2	28.42%	27.49%	28.11%	24.74%	20.84%	22.18%
<i>Weighted squared loss</i>		<i>3.060</i>	<i>4.327</i>		<i>5.367</i>	<i>29.081</i>

^a Based on stated choice data estimation of the unconstrained model

^b Based on rank data estimation of the unconstrained model.

Table 9: Earnings Choice Elasticity, Constrained Model

	Choice Data	Restricted Model ^a	Using Only Grad. Earnings ^b	Unconstrained Choice Data	Uncertainty in Earnings ^c
	(1)	(2)	(3)	(4)	(5)
For a 1% in earnings, % Δ in Prob of choosing:					
All	0.113%	0.179%	0.193%	0.121%	0.121%
Very Selective University	0.083%	0.110%	0.146%	0.091%	0.127%
Selective University	0.132%	0.204%	0.224%	0.146%	0.137%
Islamic University	0.129%	0.202%	0.202%	0.140%	0.140%
Madrassa-C1	0.110%	0.186%	0.200%	0.116%	0.100%
Madrassa-C2	0.110%	0.190%	0.193%	0.111%	0.098%

The table shows the average percent change in the probability of choosing each school with a 1% increase in age 30 earnings associated with that school.

^a Restricted model excludes the non-pecuniary outcomes (ideology; parents' approval).

^b Model ignoring uncertainty in drop-out and employment

^c Model estimates based on using the subjective earnings distribution (fitted using an individual and choice-specific Beta distribution).

Table 10: Willingness to Pay, based on Constrained Model Estimates

	Choice Data	Using Only Grad. Earnings	Unconstrained Choice Data	Uncertainty in Earnings
	(1)	(2)	(3)	(4)
Teachings aligned w/ ideology	0.406	0.528	0.416	0.394
Parents' approve of choice	0.357	0.464	0.321	0.346
Graduation Rank	-0.031	0.035	0.062	-0.023
Distance from current town	-0.201	-0.250	-0.150	-0.191

The table shows the proportion of age 30 earnings the respondent is willing to forgo for:

- (a) a 5 percentage point increase in beliefs about teachings aligned with ideology
- (b) a 5 percentage point increase in beliefs about parents' approving of the choice
- (c) a 5 percentage point increase in expected graduation rank
- (d) attending a school in a town different from one's current location.

***, **, *, + denote significance at 1%, 5%, and 10% levels, respectively.

Table 11: Choices and Utility Changes for Different Policy Experiments

	Const.	Credit	Free schooling with tax	Subsidy for Below-median income	Increased capacity + Policy (3)	Construction of new VSU	Info + Policy (3)	Info + Policy (3)	Madr. Reform
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A									
Proportion Choosing school:									
Very Selective University	0.180	0.379	0.383	0.242	0.216	0.38	0.19	0.383	0.191
Selective University	0.144	0.065	0.065	0.128	0.122	0.066	0.133	0.065	0.128
Islamic University	0.184	0.157	0.157	0.186	0.189	0.157	0.171	0.156	0.164
Madrassa-City1	0.201	0.186	0.184	0.206	0.193	0.185	0.225	0.186	0.237
Madrassa-City2	0.291	0.213	0.21	0.238	0.279	0.211	0.281	0.21	0.279
Panel B									
Utility gain (%) ^a		20.582 [8.904]	20.938 [9.028]	12.346 [5.962]	13.396 [9.265]	20.416 [8.815]	4.453 [2.266]	20.727 [8.968]	6.059 [3.31]
Utility gain as % change in age 30 log earnings ^b		55.635 [24.069]	56.596 [24.403]	33.372 [16.116]	36.212 [25.045]	55.185 [23.828]	11.449 [5.826]	53.895 [23.32]	17.606 [9.619]
Proportion who switch		0.366	0.373	0.23	0.283	0.372	0.132	0.372	0.166
Prop. with loss in utility		0	0.086	0.248	0.089	0.160	0	0.102	0
Tax Rate			12.7%	2.0%	2.0%	46.8%		13.5%	

^a Percent increase in utility as a result of the chosen school in the policy experiment, relative to the baseline constrained choice. Mean reported in first row, median in square brackets.

^b Utility gain as a percent change in age 30 log earnings. Mean reported in first row, median in square brackets.

Table A1: Correlation between Subjective Beliefs

	Ideology	Parents' approval	Graduate position	Exp. ln(earnings)	Distance	Ln(Current Consump>	Pr(empl.)	Pr(dropout)
Ideology	1							
Parents' approval	0.6564***	1						
Graduate position	0.2480***	0.2236***	1					
Exp. ln(earnings)	0.5003***	0.5205***	0.1719***	1				
Distance	-0.0366***	-0.0812***	0.0052	-0.0540***	1			
Ln(cur.cons.)	0.0499***	0.0246***	-0.0183**	-0.0290***	-0.0246***	1		
Pr(employment)	0.5270***	0.5341***	0.1874***	0.9799***	-0.0444***	-0.0233**	1	
Pr(dropout)	-0.5872***	-0.5419***	-0.2451***	-0.5692***	0.0456***	-0.0584***	-0.5687***	1

***, **, * denote significance at the 1, 5, and 10% levels, respectively.

Table A2: ML Estimates

	Restricted	Using Only Grad. Earnings	Unconstrained Choice Data	Int. With Beyond 1st Year
Teachings aligned with ideology		3.194*** (0.326)	2.895*** (0.220)	2.675*** (0.560)
Parents' approve of choice		2.654*** (0.269)	2.035*** (0.180)	1.781*** (0.444)
Graduation Rank	0.455+ (0.279)	0.153 (0.311)	0.320+ (0.213)	-0.376 (0.492)
Distance from current town ^a	-1.066*** (0.0770)	-0.952*** (0.0780)	-0.750*** (0.0563)	-0.039 (0.166)
Age 30 expected ln(earnings)	0.389*** (0.0246)	0.243*** (0.0847)	0.265*** (0.0174)	0.219*** (0.0436)
ln(Current Period Consumption)	-0.003 (0.012)	0.005 (0.013)		0.016 (0.021)
Teachings aligned with ideology X beyond 1st Year				-0.070 (0.730)
Parents' approve of choice X beyond 1st Year				0.760 (0.585)
Graduation Rank X X beyond 1st Year				0.586 (0.661)
Distance from current town ^a X beyond 1st Year				-1.110*** (0.190)
Age 30 expected ln(earnings) X beyond 1st Year				0.042 (0.0542)
ln(Current Period Consumption) X beyond 1st Year				-0.010 (0.025)
Number of students	2182	2182	2182	2182

Maximum likelihood estimates. Standard errors in parentheses.

***, **, *, + denote sig. at 1%, 5%, 10%, and 15% levels, respectively. Ideology and parents' approval are elicited on a 0-100 scale, normalized to 0-1. Graduation rank is on a 1-100 scale (normalized to 0.01-1).

^a Dummy that equals 1 if the schools is in a city different from the respondent's current location.

Table A3: Descriptive Statistics for the Beta Distributions for Age 30 Earnings (in 10,000 rupees)

	E(earnings)		Standard deviation		E(ln(earnings))		ln(earnings) with	
	graduate	drop-out	graduate	drop-out	graduate	drop-out	no uncertainty in earnings	drop-out
All	3.648 [3.016] (2.324)	2.445 [1.87] (1.593)	2.021 [1.581] (1.314)	1.543 [1.226] (0.980)	10.025 [10.065] (0.690)	9.624 [9.496] (0.600)	9.912 [9.903] (0.927)	9.357 [9.393] (0.968)
Very Selective University	5.02 [4.32] (3.193)	3.134 [2.006] (2.177)	2.78 [2.123] (1.586)	1.982 [1.423] (1.316)	10.307 [10.269] (0.711)	9.891 [9.581] (0.555)	10.278 [10.309] (0.760)	9.865 [9.903] (0.716)
Selective University	4.504 [4.182] (2.669)	2.707 [1.912] (1.819)	2.632 [2.216] (1.552)	1.781 [1.323] (1.178)	10.24 [10.33] (0.711)	9.714 [9.524] (0.583)	10.363 [10.309] (0.681)	9.749 [9.798] (0.662)
Islamic University	4.343 [4.096] (2.549)	2.51 [1.694] (1.664)	2.578 [2.216] (1.442)	1.669 [1.24] (1.109)	10.168 [10.192] (0.682)	9.65 [9.379] (0.556)	10.212 [10.309] (0.745)	9.596 [9.616] (0.683)
Madrassa-City 1	2.788 [2.791] (1.335)	2.25 [1.915] (1.317)	1.415 [1.326] (0.713)	1.336 [1.196] (0.682)	9.858 [10.008] (0.604)	9.553 [9.482] (0.625)	9.486 [9.616] (1.062)	9.1 [9.21] (1.068)
Madrassa-City 2	2.642 [2.573] (1.361)	2.051 [1.687] (1.191)	1.352 [1.226] (0.715)	1.239 [1.079] (0.658)	9.776 [9.883] (0.631)	9.469 [9.382] (0.610)	9.488 [9.616] (0.959)	8.894 [9.105] (1.190)

Table A4: School Choices, under the Policy Experiments

	Very Selective University	Selective University	Islamic University	Madr City 1	Madr City 2
<i>Constrained Case:</i>		<i>School chosen under:</i>			
		Panel A: Credit			
Very Selective University	78.16	9.32	6.78	2.20	3.54
Selective University	69.33	18.18	5.59	2.28	4.62
Islamic University	38.46	5.07	45.31	7.86	3.31
Madrassa	11.72	2.97	12.18	33.65	39.47
		Panel B: Subsidy for Below Median Income			
Very Selective University	80.54	7.78	6.16	2.02	3.49
Selective University	8.03	69.27	7.45	4.70	10.54
Islamic University	15.17	4.96	66.69	9.22	3.95
Madrassa	7.03	2.53	10.93	36.69	42.82

Table A5: Relaxing the IIA Assumption

	Multinomial Probit		Nested Logit - 4 nests		Nested Logit - 3 nests	
	ML Estimates	WTP	ML Estimates	WTP	ML Estimates	WTP
Teachings aligned with ideology	2.093*** (0.371)	0.464	3.078*** (0.358)	0.489	3.009*** (0.350)	0.492
Parents approve of choice	1.667*** (0.304)	0.391	2.135*** (0.293)	0.373	2.034*** (0.289)	0.368
Graduation rank	0.056 (0.244)	0.016	-0.140 (0.310)	-0.031	-0.107 (0.299)	-0.024
Distance from current town	-0.827*** (0.164)	-0.279	-0.706*** (0.080)	-0.167	-0.687*** (0.0793)	-0.167
ln(Current consumption)	0.002 (0.010)		0.008 (0.012)		0.008 (0.012)	
Age 30 expected ln(earnings)	0.168*** (0.032)		0.229*** (0.026)		0.222*** (0.026)	
Tau: VSU			1.000			
Tau: VSU+SU					0.763*** (0.115)	
Tau: SU			1.000			
Tau: IU			1.000		1.000	
Tau: Madr			0.660*** (0.0681)		0.640*** (0.0671)	
Number of students	1402		1402		1402	

Standard Deviations in Parentheses. ***, **, * denote sig. at 1%, 5%, and 10%, levels, respectively.