

**Can't Buy Me Love:  
A Field Experiment Exploring the Tradeoff Between Income and Caste  
in the Indian Matrimonial Market**

Subhasish Dugar  
University of Calgary

Haimanti Bhattacharya  
University of Utah

David Reiley  
University of Arizona and Yahoo! Research\*

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**Abstract:** This study attempts to measure discriminatory preferences using a field experiment in an established matrimonial market in India. Indian marriages exhibit strong marital segregation along caste lines, and grooms typically advertise their income in matrimonial advertisements. This combination yields an ideal opportunity to measure discriminatory preferences in terms of foregone financial opportunities. We place matrimonial ads in a leading Bengali language newspaper on behalf of fictitious potential grooms. We systematically control *caste* and *income* characteristics of these grooms in order to measure substitution between these two attributes on the part of respondents. Responses from potential brides confirm a strong “own caste” preference, as brides respond more often to their own caste than to other castes. However, inter-caste responses, which constitute a significant proportion of the total responses, give us a measure of these discriminatory preferences in terms of groom’s income. In particular, we find that the group of highest-caste brides sends an average of 1.6 additional responses for every 1000-rupee increase in the monthly income of a lower-caste groom. Discriminatory preferences are so strong that even a quadrupling of income is not enough to make up for a one-level caste difference between grooms. Extrapolating out of sample from our data, we estimate that an eightfold difference in income might be required to make up for the difference in response rates by potential brides. These results indicate that affirmative action policies in India, which seek to enhance the income of the lower-caste population, are not likely to produce any significant change in inter-caste marriage.

**Keywords:** Marriage Market, Discrimination, Field Experiment.

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\* Dugar: Department of Economics, University of Calgary, 2500 University Drive, N.W., SS 454, Calgary, T2N 1N4, Canada (email: sdugar@ucalgary.ca); Bhattacharya: Department of Economics, University of Utah, 1645 E. Campus Center Dr. Rm. 308 Salt Lake City, UT, 84112 (email: hb2267@columbia.edu); Reiley: Department of Economics, University of Arizona, 401CC, McClelland Hall, Tucson, AZ, 85721 (reiley@eller.arizona.edu). The usual disclaimer applies.

## 1 Introduction

Strong discriminatory preference pervades many spheres of life. Recent research indicates that it significantly influences choice of a marriage partner (Fisman et al., 2008, 2006; Levin et al., 2007; Wang and Kao, 2007; Hitsch et al., 2006). For example, Fisman et al. (2008) study mate selection behavior in a Speed Dating experiment, involving students from Columbia University, and observe that females of all races strongly discriminate on the basis of race unlike their male counterparts. They detect strong racial preferences even in a relatively progressive population, and thus conclude that discriminatory preferences are most likely to play a crucial role in yielding significantly low inter-racial marriages in the U.S. Using data from the U.S. Census for 1880-2000, Fryer (2007) documents that interracial marriage rates for whites, blacks and Asians have trended up in last few decades, even though the absolute rates are still minuscule. Hitsch et al. (2006) find evidence of strong endogamy (marrying within a group) using online dating data. Kurzban and Weeden (2005) illustrate the presence of same race preferences. A number of surveys (Mills et al., 1995; Mok, 1999) also reveal the same negative attitude toward inter-racial relationships among men and women.

While these studies document overwhelming absence of inter-group preferences in marriage markets, a few studies (e.g., Fisman et al., 2008; Fryer, 2007; Hitsch et al., 2006) scrutinize important role of determinants of such preferences<sup>1</sup>. These studies uncover a set of exogenous covariates such as age, residential location, education, veteran status, physical attributes, and demonstrate their specific role in explaining the choice of

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<sup>1</sup> There exists a large literature in psychology, sociology, and anthropology that explores impacts of various mate attributes on marital preferences. See Buss (2003) for a comprehensive survey of these findings. Additionally, a strand of literature deals with structural estimation of mate preferences using data on final matches (see Choo and Siow, 2006; Bisin et al., 2004; Wong, 2003). In contrast, this study uses data on mate selection decisions than final matches.

an inter-group partner. For instance, Fryer (2007) finds that higher level of education had become an important determinant of interracial marriage by the end of the twentieth century. Barring these studies, there is not much research that attempts to understand empirically what factors may reinforce or weaken such discriminatory preferences for potential mate selection. Identifying the distinct role of these determinants would deepen our understanding of such preference in this enormously vital territory of human behavior.

Against this backdrop, this study explores how economic incentives influence discriminatory mate selection preference in the context of a well-functioning matching market. Specifically, we investigate if relatively higher income of a discriminated agent (e.g., potential inter-group male partner) can plausibly overcome biased preference of a discriminator (e.g., females) in the context of a marriage market? Or is this discriminatory preference large enough to offset substantial income brought in by a prospective inter-group individual? Does there exist some level of substitutability between these two components (i.e., income and biased preference)? What are the magnitudes, if any, of these potential trade-offs? Beyond these questions, our understanding of the exchange *process* of characteristics on both sides of a marriage market is also quite limited. How do agents in such a market attempt to trade attributes to strike a match? Our study also sheds light on this particular process by exploiting the features of the market in which we conduct our study. In contrast, studies by Fishman et al. (2008, 2006) and Hitsch et al. (2006) do not concentrate on trade-off between an important mate attribute (i.e., income) and such preference<sup>2</sup>.

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<sup>2</sup> Becker (1973, p. 12) shows that the incentive to marry positively correlates with income potential of each agent in a marriage market. Psychologists have long studied the determinants of mate selection using

The principal research question of this study can be construed to comprehend a basic principle in economics: the interactive relationship between economic incentives and agents' preferences in a specific market context. The relationship can be understood by appealing to Becker (1957). The basic idea is that individuals can have tastes for discrimination against members of certain demographic groups in terms of mate selection process, however this discrimination may not necessarily be infinite. In that case a discriminatory agent may still choose a mate from the other group as long as the *net income* of the out-group member is strictly higher than the net (or gross) income of an in-group member (holding other marriage market characteristics fixed). Thus discriminatory agents may trade off disutility (of marrying someone outside his/her own group) for higher income<sup>3</sup>.

However, from the description of some of the results in the introductory paragraph, it may appear that the tastes of agents are so overwhelmingly biased in favor of discrimination that, relatively, the economic incentives are of only minor or no importance. For example, if the discriminatory preferences in agents were large, then it would lead to complete segregation in a marriage market (Becker; 1957, p.22). Akerlof (1976, p.609) in contrast maintains that discriminatory incentives may well respond to economic stimuli. Existing theories in sociology (Kalmijn, 1993; Blau, 1964; Merton, 1941) too extend support to such substitution between biased preferences and characteristics valuable from the standpoint of a marriage market. Specifically, these

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survey method, and one general finding is that women place greater emphasis on earning potential of men when seeking long-term relationships (Regan et al., 2000; Stewart et al., 2000). Hitsch et al. (2006) also corroborate this particular finding.

<sup>3</sup> Becker (1957) introduces the concept of a *discrimination coefficient* ( $d$ ) that measures the extent of discrimination against a particular group, and the magnitude of  $d$  may provide an estimate of monetary compensation (e.g., in form of extra income) needed by a discriminatory individual in order to engage in a plausible trading relationship with a member of the discriminated group. See Becker (1957, p.14) for similar examples.

theories state that there exists some substitutability between the value of an agent in a marriage market, determined by that agent's characteristics, and the cost of marrying an agent with such characteristics. The theoretical predictions from this strand of models would envisage in our framework that in equilibrium agents with discriminatory preferences may marry a minority group member in exchange for superior characteristics possessed by that minority group member. Given the disagreement linked to differing views on whether such substitutability may be present or not, it is natural to wonder about the real effects of income incentives on such preferences. Our study permits a direct test of this conjecture.

Data limitations however make it difficult to empirically test these questions<sup>4</sup>. To circumvent this difficulty and exploit the advantages of a naturalistic environment, we conduct a field experiment that builds on the correspondence testing methodology that has been previously used to understand minority outcomes in the U.S. and the U.K. (Bertrand and Mullainathan, 2004; Riach and Rich, 1991; Brown and Gay, 1985; Jowell and Prescott-Clarke, 1970). In particular, the market that we use as a testbed to examine these questions is a leading Bengali language newspaper in the state of West Bengal, India that publishes matrimonial advertisements on a regular basis<sup>5</sup>. Majority of the leading dailies in India publish several columns of such advertisements on a particular day, and mostly parents having marriageable sons or daughters place these

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<sup>4</sup> In principle, we could shed light on the research question by using inter-group marriage register data. However, with this approach we would not have access to the corresponding income data, and as a result we cannot identify the trade-off between income and discriminatory preference. Moreover even if this data were available, we need to systematically control the income and other marital attributes of individuals in order to obtain a precise idea about this trade-off, which we cannot carry out in a natural setting unless appropriate controls are implemented. These requirements rule out the use of marriage data, and necessitate a field experiment.

<sup>5</sup> Newspapers have long provided effective channels through which individuals search for marriage partners in India and elsewhere (Ahuvia and Adelman, 1992; Lynn and Bolig, 1985; Reddy, 1978; Gist, 1953).

advertisements. The characteristics most commonly mentioned in these advertisements are *caste*, age, height, education, occupation, *income*, physical appearance, and financial status of a family<sup>6</sup>. So this market furnishes us with an opportunity to investigate the trade-off hypothesis by controlling income and other characteristic of individuals.

In order to examine the trade-off hypothesis, we require an indicator of discrimination, and the caste-based Indian society provides an ideal setting where caste of an individual is a proxy for *statistical discrimination* and, additionally, a parameter of social status (Deshpande, 2000; Rao, 1992; Scoville, 1991; Dumont, 1980). The Hindu society is historically divided primarily into four mutually exclusive, exhaustive, hereditary, and endogamous castes; moreover recent research concerning Indian marriage system indicates that same-caste marriage is essentially *universal* (Deolalikar and Rao, 1998; Driver, 1984; Reddy and Rajanna, 1984)<sup>7</sup>. Available empirical evidence thus suggests that there may exist very little or no substitutability between caste status and income<sup>8</sup>. Thus, a strong intra-caste marital preference coupled with a well-functioning matrimonial market offers a rich environment for testing our main research question.

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<sup>6</sup> Despite the widespread use of newspapers as a medium of mate selection, there may exist a belief that persons who use personal ads are somehow different from the population at large. But there is little evidence to support this view, and there are several reasons for rejecting it. See Lynn and Bolig (1985) and Austrom and Hanel (1983) for comprehensive evidence on this issue. Moreover, the newspaper that we use for our study has been in circulation for more than hundred years, is the most widely circulated newspaper in India within that language, and has been carrying these ads for a long time. Also, matrimonial advertisements that appear in this newspaper differ significantly in scope and purpose from those of regular personal advertisements. For example, since parents insert these ads for their marriageable sons and daughters, therefore these ads are more serious in nature than just finding a partner for casual short-term relationship. We defer a detailed discussion on this issue until the next section.

<sup>7</sup> However there exists a clear incentive for lower caste females to marry upper caste males to gain caste status since husband's caste determines that of the wife and children. On the other hand, upper caste females would lose their caste status if they were to marry lower caste males (Rao and Rao, 1980; Avasthi, 1979).

<sup>8</sup> Anderson (2003) formulates a theory that shows that in caste-based societies, an increase in wealth dispersion leads to an increase in dowry payments, whereas in non-caste-based societies similar increase in wealth dispersion has no real effect on dowry payments. This increase in dowry payments is caused by, in conjunction with an increase in wealth levels of heterogeneous groups in the caste-based society,

Finally to operationalize our experiment, we create nine unique matrimonial advertisements, each corresponding to a distinct groom type<sup>9</sup>. These grooms belong to one of the three blocks of advertisements, where each block contains three fictitious grooms from a given caste group. To experimentally manipulate the perception of caste, we consider three different caste groups, high (*Brahmins*), medium (*Kayasthas*) and low (*Namasudras*), strictly ranked in order of societal status in the state. To methodically vary the income characteristic of each groom within a block, we consider three different monthly income levels (i.e., high, medium, and low) that are considered appropriate in the study region. Thus we construct advertisements for nine distinct grooms who differ either in monthly income (within a block) or in caste status (across a block), while controlling the assignment of other characteristics appropriate for this particular matching market<sup>10</sup>. We post these advertisements in two different editions of the same newspaper with sufficient time gap; measure responses from prospective brides' families for each groom type, and thus cast light on the research hypothesis.

Our choice of this specific marketplace is prompted by the following three factors. First, for our purpose we require a matching market that should meet two essential criteria – (1) a market where we could systematically control the income and other characteristics of potential grooms, and (2) participants in that market must already exhibit a strong intra-group marital sorting preference. The matrimonial market that we employ in this study meets the above two conditions. (1) is important. Since two potential

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willingness of lower caste females to pay higher monetary compensations to potential higher caste grooms who can be ranked by their earnings. Rao (1993) provides a “marriage squeeze” argument to explain the rising price of husbands in modern India, and supports his argument with survey data.

<sup>9</sup> Since in Indian caste-based society a male does not experience a loss of his caste membership even if he marries outside his own caste group, therefore posting advertisements on behalf of potential brides would not shed light on the research hypothesis that we are primarily interested in. As a result, we decided to post advertisements on behalf of potential grooms.

<sup>10</sup> We defer the discussion of how we construct these advertisements until the next section.

grooms from two different castes that appear similar (except their caste status) to researchers may look very different to prospective brides. So any matching market outcomes along the line of own-caste preference could just as easily be attributed to differences in other characteristics (and not the caste dimension) that are observable to prospective brides but unobservable to researchers. However, if researchers could methodically control such other characteristics of grooms, then any difference in marriage market outcomes could be attributed with much confidence to the manipulation of either the caste or the income features of grooms.

Second, since subjects of our experiment are not aware that they are being studied, this aspect of our experiment allows us to avoid many of the demand characteristics and impression management that may arise in other environments, and possibly affect research outcomes. The market we choose affords us to avoid such pitfalls. Third, conjunction of an exceptionally strong discriminatory preference for mate selection and a reputable market for matrimonial advertisements presents us with a unique opportunity to put our research questions to a rigorous test.

The rest of the paper is organized as follows. Section 2 lays out the experimental design; section 3 presents the main results. In the last section, we discuss possible interpretations of our results, how our results trace back to different marriage market theories, and finally conclude.

## **2 Experimental Design**

### *2.1 Construction of the Advertisements*

The main task of the experimental design is to construct advertisements for the potential grooms that are to be sent to the newspaper. The objective is to produce a set of

advertisements that must be representative of the ones that actually appear in that newspaper. To achieve this goal, we collected 2777 actual advertisements from various randomly selected editions of the same newspaper (over a course of four months), posted on behalf of potential grooms seeking responses from prospective brides<sup>11</sup>. This would help us identify a set of mean groom characteristics such as age, height, education, physical appearance, job, and income that can approximately inform the construction process of our set of advertisements. More importantly, compilation of the actual advertisements would provide us with a realistic estimate of mean monthly income of a typical potential groom in this market to which we can anchor the income figures that we will actually use in the fictitious advertisements.

Tables 1A and 1B report the summary statistics, by each caste group, of the advertisements compiled from the newspaper. Several observations are in order. First, there are no major differences in terms of mean height and age across the caste groups. Second, the aggregate mean monthly income is approximately Rs. 15858 (on average 45 percent of all postings mention an income figure); the mean income positively correlates with societal rank of a caste, and this correlation is in close agreement with Deshpande (2001). The mean income for each caste group in addition displays a high degree of variance, and our experimental design exploits this specific feature of the market. Recall that the primary goal of the design is to construct advertisements for potential grooms that must differ notably from each other in terms of monthly income and in addition,

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<sup>11</sup> On average 1000 advertisements are published on every Sunday in this newspaper. Advertisements (both potential grooms and brides) from a specific caste group are generally clubbed together. So it is safe to presume that a potential bride or groom's family (from a given caste group) that is looking for an ideal match from any caste group may glance through all the ads published in that section of the newspaper. A typical ad runs for three to four very short lines that contain the previously mentioned information. Since the newspaper charges on the basis of total number of words put in an ad, people generally try to keep an ad very short and precise. Hence it does not take a lot of time for a reader to go through a series of such ads.

advertisements with considerably high or low monthly incomes must appear quite realistic<sup>12</sup>. The high dispersion in actual income data helps us achieve the last objective by assuring us that in this market such advertisements appear on a regular basis. Third, a significant percentage of these advertisements mention age, height, education, nature of the job, and physical attribute. In case of education, mostly the name of a degree (e.g., B.A., B.Sc., B.Tech., M.A. etc.) is mentioned as a proxy for educational achievement, and approximately half of the times a field of study is associated with the degree. Fourth, a surprisingly higher percentage of these potential grooms hold a government job, which is easily understandable since jobs in the public sector offer much desirable employment security in many developing countries (Frank and Lewis, 2004).

The collected information supplies essential structural inputs into our advertisement production process. To initiate this process, at the outset we chose the following three different caste groups - *Brahmins*, *Kayasthas*, and *Namasudras* for our fictitious grooms<sup>13</sup>. Each of our chosen caste groups belongs to only one of the three main castes, namely, *Brahmins*, *Kshatriyas* and *Sudras*, respectively<sup>14</sup>. These caste

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<sup>12</sup> If actual incomes of prospective grooms in this market did not exhibit some variability, then this would have ruled out this market as a potential testing ground for our income-preference trade off hypothesis. In that case, grooms with either very low or high income would stand out as outliers, and thus introduce a major flaw in the design. However the highly variable income data alleviate such concerns. One may also suspect that advertisements that mention grooms' incomes do so because these grooms have higher than average earnings generally found in that state. High frequency of considerably low income figures reported in these ads dismisses this view as well (see Figure 1).

<sup>13</sup> A person's last name often carries the identity of the caste he or she belongs to. But in many parts of India, a person's name (first or last) is not a conclusive indicator of the caste identity (unlike West Bengal). However, if a person is named in the traditional way, it is often possible to identify his or her caste from the last name (Ramu, 1977).

<sup>14</sup> The ancient *Hindu* society is divided into four main endogamous caste groups, namely, *Brahmins*, *Kshatriyas*, *Vaisyas*, and *Sudras*. Since each main caste is further sub-divided into several subcastes and there exists a host of surnames for each of these castes and subcastes (Deshpande, 2001; Gangopadhyay, 1964), we decided to indicate only the main caste of a fictitious groom in the advertisement and not the last name. 69 percent of all the actual advertisements that we collected indicate only the caste of a groom, and not the last name. Even though the *Hindu* marriage system prevents marriages across main castes, but a marriage between two individuals coming from two different subcastes (from the same main caste) is

groups are similar with respect to their cultural and social behavior, except the societal rank in the state of West Bengal (Harlan and Courtright, 1995). So the reported segregation in marriage markets in West Bengal can mostly be attributed to discriminatory preferences, and not to any cultural differences across these caste groups. Our choice of these specific caste groups has been prompted by three main reasons. First, each of the included caste group in our design has an unambiguous social ranking in the study region. *Brahmins* are at the top of the caste hierarchy in the state followed by *Kayasthas*, and *Namasudras*<sup>15</sup>. Second, marriages among these caste groups have been claimed to be practically non-existent, thus will allow a rigorous test of our main research hypothesis (Corwin, 1977; Gangopadhyay, 1964). Third, each caste group is numerous present in the state, and therefore any tendency to marry across caste lines may not be driven by pure supply side effects (The Census of India, 2001)<sup>16</sup>.

We manufacture a total of three blocks of advertisements. Each block contains three grooms from a *given* caste group. To systematically manipulate the income characteristic of these three grooms within a block, we consider the following three

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permitted (Davis, 1941). Therefore, our design does not exclude any potentially interested subcaste group (within a caste) from responding to our advertisement for a particular groom, and at the same time this choice avoids the complexity that may arise from web of subcastes and the consequent surnames.

<sup>15</sup> *Namasudras* are one of the major scheduled castes (SCs) in West Bengal, according to the 2001 Census of India. SCs, which sit at the bottom of the caste-hierarchy, are generally communities that were explicitly recognized by the Constitution of India in 1950 as requiring special support to overcome centuries of discrimination by mainstream *Hindu* society (Holla, 2007). The total population of West Bengal at 2001 Census has been 80,176,197. Of these 18,452,555 persons are SCs, constituting 23 per cent of the total population of the state. There are 59 notified SCs, and all have been enumerated in 2001 Census. The *Rajbanshi* and *Namasudra* having more than 3.2 millions population each; together these two groups constitute 35.8 per cent of the total SC population in the state. For an extensive discussion on *Namasudras* in the West Bengal, see Bandopadhyay (1997).

<sup>16</sup> The relative supply of each included caste group in West Bengal may potentially affect inter-caste marriage rates. For example, the *Namasudras* may be more likely to marry outside their own caste because they make up only a small fraction of the total population of West Bengal. In other words, many of their marriage prospects are non-*Namasudras*. However, we contend that their sheer presence, in absolute number (3,212,393 according to The Census of India, 2001), is large enough to discard any such supply side argument. We discuss more on this issue in the next section.

monthly income levels – high (*Rs.35,000*), medium (*Rs.15,000*) and low (*Rs.7,000*). We assign these three income figures to the three potential grooms within a block, one for each. This assignment process therefore results in a total of nine grooms, divided equally into three caste groups (or blocks), and each groom within a group differs from the other two in terms of monthly income. The main advantage of our chosen monthly income levels is that they are dissimilar enough to produce a large effect (in terms of response received from the other side of the market) to be at least in principle observable in response data.

To arrive at these income figures, we utilize the distribution of monthly income of actual grooms advertised in various editions of the newspaper, as shown in Figure 1. These income figures were reported either in monthly form or in annual form. We computed the monthly figures from the annual figures whenever necessary. We employ Rs. 15,000 as the *medium* monthly income level (an approximation of the aggregate mean monthly income of Rs. 15,858, see Table 1) in our design around which we manipulate the low and high-income levels. A close inspection of Figure 1 reveals that increasingly fewer incomes occur toward the upper tail of the distribution, and there are very few observations in excess of Rs. 35,000 (this pattern is valid across each caste group in the monthly income data, which we do not report here). As a result, we choose Rs. 35,000 as the *high* monthly income level in our design. In the lower tail of the income distribution, most observations fall in the range of Rs. 4,000 – Rs. 10,000. We choose the mid-point of this range, that is, Rs. 7,000 as the *low* monthly income level<sup>17</sup>.

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<sup>17</sup> We planned to experiment with a range of income figures (for each level) before posting our ads with these ones. Since we were not sure which income figures might elicit inter-caste responses, if any, this was our strategy. However since the two batches of advertisements elicited considerable number of inter-caste responses, we decided to stick with these figures only and did not pursue with other figures.

As a check of appropriateness of our income figures, we conducted a survey in the three districts (i.e., Kolkata, Howrah, and Birbhum) in West Bengal. The first two districts represent a combination of urban and semi-urban areas whereas the last district is mostly composed of semi-urban and rural areas. According to the income indices computed by the Executive Summary, West Bengal Human Development Record (WBHDR, 2004), Kolkata is economically the most affluent (the index value is 0.73) and Birbhum is the most impoverished (0.27), and Howrah (0.53) lies in between. These districts were chosen to reflect perceptions of individuals, belonging to various income categories, about “what constitutes a low, medium, or high income level for a marriageable male in the state of West Bengal”. Each responder was shown a list of income intervals, and was asked to mark one of them that he/she thinks a low/medium/high income marriageable male in the state should belong to. There were three separate questions for the three income levels, and each responder had to choose only one income interval for each income level. The shown income intervals ranged between Rs. 2,000 and Rs. 41,000, and increased in steps of Rs, 3,000, thus there were a total of ten income intervals to choose from. There were a total of 100 responders randomly chosen from each district<sup>18</sup>.

There are three main observations. First, majority of the responders from Kolkata and Howrah choose the interval (Rs. 6,000 – Rs. 9,000) when asked to choose an interval for a low-income level for a potential groom. Most of the responders from Birbhum choose the interval (Rs. 2,000 – 5,000) when the same question was asked. Second, for

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<sup>18</sup> There were equal numbers of randomly chosen male and female responders. The survey had a total of 22 questions and the main purpose of the survey was to form a rough idea how residents of the state perceive various attributes that are relevant for an arranged marriage market. We do not report all the results from the survey here.

high-income level, most choices typically concentrate on the following three income intervals: (Rs. 22,000 – Rs. 25,000), (Rs. 26,000 – Rs. 29,000), and (Rs. 30,000 – Rs. 33,000), respectively for Birbhum, Howrah, and Kolkata. Third, for medium-income level, choices mostly concentrate on the following two income intervals: (Rs. 10,000 – Rs. 13,000) and (Rs. 14,000 – Rs. 17,000), most of the responders from Birbhum chose the first interval while most of the responders from the other two districts chose the last interval. In a nutshell, the survey results correspond closely with the experimental income figures and thus provide much required confidence in our chosen income parameters.

In the later stage of the experimental design, we assign the following characteristics to each of the nine potential grooms: age, height, and job. We restrict ourselves to three different age and height figures (30, 31 and 32 for age & 64, 65, and 66 inches for height), and randomly assign one of them (for each characteristic) to each of the nine grooms. In order to prevent any subjective characteristic to directly influence responses received against our advertisements, we decided not to use any physical characteristic<sup>19</sup>. In light of strong preference among the population for a governmental job, we further restrict ourselves to only one occupational category, that is, a government job, and assign this job characteristic to each of the nine grooms. Since there exists a positive correlation between educational achievement and earnings of potential grooms in our collected data, we assign a Masters degree to the medium and high-income grooms, and a Bachelors degree to a low-income groom (without indicating the field of study). The newspaper office randomly assigns a PO box number for each posting when the

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<sup>19</sup> Fishman et al. (2006) and Hitsch et al. (2006) find strong evidence that physical attractiveness of individuals play a crucial role in influencing the mate selection process. Since on average 42 percent of the advertisements that we collected do not mention looks of prospective grooms, therefore we believe that our advertisements (which also do not mention looks) do not constitute a major departure from a typical ad found in this market.

advertisements are submitted for publication. It is implied that each groom in our design represents a Bengali male with the above characteristics.

## *2.2 Why West Bengal?*

West Bengal is one of the few states in India that has an impressive socio-political history. The state boasts of considerable achievements in the spheres of land reform, education (69.22 percent literacy rate, The Census of India, 2001), and has witnessed strong social and working class movements with strong anti-caste emphasis. According to Deshpande (2001), West Bengal is in the middle of the spectrum in terms of absolute economic deprivation of SCs and Scheduled Tribes (STs); however in terms of inter-caste economic disparity (SC/ST versus ‘others’), it is one of the states with the least disparity<sup>20</sup>. In case of a state with very high inter-caste economic disparity, an income of Rs.35000 (which represents high income in our design) for a low-caste groom would be viewed as an outlier or unrealistic, which is not the case in West Bengal. Thus the low inter-caste economic inequality adds an important touch of realism to our high-income, low-caste advertisements and at the same time makes the tradeoff technically more feasible.

One might argue that given this substantial socio-economic profiles and political history, West Bengal appears to fulfill several of the conditions that would be needed to support our income-caste tradeoff hypothesis and thus may bias our results, which we seek to contest. The predominant perception in the related literature is that the caste hierarchy is deeply entrenched in Indian society, i.e., there is virtually no substitutability between caste status and any other matrimonial attributes. If this reflects a true picture of

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<sup>20</sup> The available data divide the population into SCs, STs, and ‘Others’. The latter (everyone else) is a very large and heterogeneous category.

reality, then there is little hope to obtain any support for our research hypothesis. The objective of this study is to test if caste-based discrimination can at all be weakened by economic incentives in the most favorable set up. Failure to find evidence in support of our research hypothesis in such a favorable state would only imply that there remains little or no hope about the ability of economic progress to overcome the caste considerations, at least, in Indian marriage markets.

### *2.3 Responses to Advertisements*

We measure whether a given advertisement elicits a response from an interested bride's family. Families send their responses, mostly in form of detailed letters, to a unique PO box number that was assigned to each advertisement by the newspaper at the time of submission. These PO box numbers help the newspaper identify the responses for each posting. After two weeks from the date of publication of each of the two batches of advertisements, the newspaper delivered the packets of responses to our physical address on a regular basis until the flow of responses finally tapered off; a label on each packet clearly indicated the advertisement for which those many responses were received. Thus there remained no scope for responders to contact us directly, and this delivery method also kept our identity perfectly confidential.

Most of the responses were in the form of long letters, mainly from the guardians of the potential brides. Others were written on postcards and inland letters, available from a typical Indian post office in this part of the country. The average cost of sending a response may range from Rs. 3.00 to Rs. 7.50 (equivalent to \$0.07 and \$0.19 respectively), calculated from our data. Very few respondents included a resume and a picture of the potential bride, in addition to the letter. A typical response includes the

following pieces of information: caste, age, height, number of sisters/ brothers, family size, occupations of parents (government employees, businessman, etc.), if any of the parents is not alive, potential bride's education level, occupation, skin complexion, looks, and a short of description of family wealth (whether the family owns a house, a plot of land, an apartment etc.). Some responses also mentioned some other features such as whether any member of the family resides abroad, siblings' occupations, and occupations of brother-in-laws and sister-in-laws.

One may suspect that description of characteristics that advertisers claim to possess may suffer from widespread misreporting behavior, and as a result one would have little faith in our interpretation of this data. However the manner in which this particular market functions may discard such doubts. After the first round of contact, if both parties (i.e., families) still remain interested in each other then they generally agree to meet at one's house to further discuss other details, and introduce a potential bride to a potential groom (Reddy, 1978). These further meetings add a certain strategic element to this arranged marriage 'game', which is important for our purpose. Specifically, any false reporting regarding agents' characteristics can easily be verified during these later meetings, and thus any misreporting should not be part of a potential match. Also prospective responders to our advertisements were not aware that they are a part of an experiment, so we do not have strong reasons to expect considerable incidence of over or under reporting of true characteristics that may render our data useless.

We now discuss the potential weaknesses of our experiment. Akin to Fishman et al. (2006, 2008), Hitsch et al. (2006), we do not have data on final matches, instead we simply collect responses from brides' families that only express their willingness to

initiate a negotiation process, which may or may not result in a final match. In contrast, what one may really care for is a final match. Despite this particular limitation of our study, one would normally expect to have a positive association between initial responses and final matches, after allowing moderate level of frictions in the mate selection process. In that sense our parameter for capturing the extent of inter-caste marriages in this context may be a crude one, but still a useful apparatus.

Another potential weakness is that newspaper ads are only one of the many potential channels via which marriage alliances are sought. Social networks, on-line dating websites are other established examples of matrimonial markets through which individuals search for potential mates, the ones that are not studied here. We do not possess any data on the proportion of total marriages in India that are arranged via each of these channels, however, as indicated earlier newspapers ads have been playing a critical role in bringing together both sides of the market for a long time in India, and we simply rely on that trusted channel for executing our experiment.

### **3 Results**

The nine advertisements, published in two different editions of the same newspaper, received a total of 1123 unique responses. The responses were received from various parts of West Bengal and from other states as well that include rural, semi-urban and urban areas. The analysis presented below pools the responses received against each of the two batches of advertisements. As mentioned earlier, apart from the responder caste each response lists several attributes of a prospective bride and her family. While some of these attributes (e.g., age, height, number of siblings etc.) are objective in nature and therefore easy to condense into a single statistic, others (looks, skin complexion,

occupations etc.) are either too subjective to evaluate on a cardinal scale or vary so much that it is hard to capture them in a single dimension. To deal with the subjectivity of some of the reported characteristics, we define (being informed by the data) various categories for each of them and assign each response to one of these categories.

Since it is difficult to rank and report numerous reported occupations of parents of potential brides, we broadly classify them as ‘Government job’, ‘Private job’, ‘Business’, ‘Retired’, and ‘Housewife’, and allocate each response to one of these categories. We create a binary variable of the form ‘employed’ and ‘not employed’ to capture a potential bride’s employment status and assign each response to either of the two. We define three (ordinal) categories of ‘looks’ - ‘very good looks’, ‘good looks’, and ‘average looks’, and assign each response to one of these categories, based on the self-reported description of looks of girls. Similarly, we create three distinct categories to capture various skin complexion types - ‘very fair’, ‘medium fair’ and ‘fair’, and assign each reply to one of these. We categorize the educational qualification of a girl into ‘below Bachelors’, ‘Bachelors or equivalent’, ‘Masters or equivalent’ and ‘Ph.D.’. Family wealth situation is often reflected in the data by ownership of a house, an apartment, or in some cases a piece of land. We create a binary variable, ‘own a house or an apartment’ and ‘do not own a house or an apartment’ to reflect a family’s financial health, and assign each response to either of the two categories. Tables 4 – 8 report the incidence of each of these characteristics in the aggregate data, and in each responder caste group.

### 3.1 *The Aggregate Response*

Table 2 presents the total number of responses received by each of the nine grooms, classified by their distinctive caste and income features. The last row indicates

that the total number of responses (aggregated over the caste groups) rises with increase in groom monthly income. The LI, MI, and HI grooms receive approximately 27, 30, and 43 percents of total responses respectively<sup>21</sup>. The number of responses received by LC grooms increases monotonically in monthly income; while the same monotonicity holds true for MC grooms, it does not appear to be the same case for HC grooms. Overall there appears to be a strict preference for higher income grooms among responders.

The last column in the table indicates that HC grooms receive the highest number of responses (37 percent), whereas MC and LC grooms equally share the rest of the total responses (approximately 31.5 percent each). This *may* be suggestive of the fact that HC grooms are the most preferred while the other two types are equally preferred. Holding the monthly income level of grooms fixed at LI, we find that higher the caste of a groom, the larger is the number of responses received by that groom. Grooms under MI follow the same pattern, however this trend is completely reversed in case of grooms that belong to HI level. We conducted similar analyses separately for each batch of responses, and found the above trends to be present in each data set. The dynamics that (plausibly) give rise to these trends in the aggregate data can be uncovered by analyzing the responses coming from responders belonging to different caste groups.

There could be a potential concern that these response patterns are driven by pure supply side effects, and thus may misrepresent true preferences (for various groom types) of responders. That is, the distribution of three caste groups in the total state population or the income distribution within a specific caste may have shaped these response patterns rather than the true preferences of responders. For example, the last column in

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<sup>21</sup> We will use HI, MI, and LI for high, medium, and low monthly income level respectively, and HC, MC, and LC to indicate high, medium, and low caste respectively throughout this section.

Table 2 may not necessarily imply an underlying preference for higher caste grooms. If these three caste groups are present in the state population in that specific order (in terms of their respective shares), then the last column may simply reflect respective share of each group on the demand side of the market and not a preference for the castes of the potential grooms<sup>22</sup>. In general, in any matching markets determining preferences for mate selection from observed outcomes is always difficult because a given outcome is often consistent with a particular preference structure or a supply side account. However, our analyses in the following subsections contradict such effects. Thus we believe that the assumption of no supply side effect and the consequent no strategic behavior is justified, although, some element of such behavior may be present in the data.

### 3.2 *Responses Classified by The Responder Caste*

Tables 2A, 2B, and 2C present the distribution of responses by responder caste type. The number in each cell represents the percentage of  $i^{th}$  caste responses that were sent for the  $j^{th}$  groom type. We divide the total responses into two categories, intra-caste and inter-caste responses. While the analysis of intra-caste responses sheds light on the strength of own-caste preference in the context of this market, the scrutiny of inter-caste responses focuses on the discriminatory preference- income trade off hypothesis.

#### 3.2.1 *The Intra-Caste Responses*

The last column of each table reveals that each responder caste group sends the largest proportion of their total responses to the grooms who belong to their own caste. For instance, the three HC grooms receive approximately 59 percent of all HC responses,

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<sup>22</sup> The Census of India (2001) provides population data at the state level only for the following three groups: SCs, STs, and Other Backward Classes (OBCs). All the other castes are clubbed under the general category. The HC and MC groups included in our study belong to the general category. Therefore we do not have data about the shares of these two caste groups in the state population, although we have the corresponding data for the LC group.

and the corresponding figures for the MC and LC grooms are approximately 42 and 59 percents respectively. This is a clear indication of a strong own-caste preference among the responders and is consistent with the dominant view in the literature pertaining to the Indian marriage system. The sheer magnitudes of these percentages also suggest that HC and LC responders may have stronger own-caste preference than that of MC responders. In other words, MC responders exhibit relatively higher propensity to respond to grooms of other castes in our data, which may be attributed to the relative position of this caste group in the caste hierarchy, as they can respond in both upward and downward directions unlike responders from the other two caste groups.

The analysis also reveals that the HI groom in each caste group receives the highest number of responses that are from their own caste. Moreover there exists a positive relation between the number of own-caste responses and monthly income of a groom in that caste group. For example, the HC groom with HI receives 23 percent of all HC responses. The corresponding figures for {MC, HI} and {LC, HI} groom types are approximately 22 and 25 percents respectively. These findings accord well with an important observation made in Anderson (2003) that brides' families are expected to be especially sensitive to earnings of own-caste grooms. Since an own-caste alliance does not imply any gain or loss of caste status for females, income becomes one of the primary determinants of mate selection. To sum up, the analysis of intra-caste responses indicates that each responder caste group prefers own-caste grooms to grooms from the other castes, and among those the groom with the highest income seems to be the most preferred.

The argument that potential supply side effects may cause above response patterns is plainly refuted by our data. To see this consider the following: in West Bengal LC (in our design) constitutes a relatively small proportion of the total population (only 4 percent of the state population are *Namasudras* as per The Census of India, 2001). This means most of their marriage prospects are in the upper caste groups. If the assumed supply side effect shaped the responses of LC responders, then they are expected to respond relatively more frequently to MC and HC grooms than to grooms who belong to their own caste, simply in order to increase the likelihood of finding a potential groom. Since in the data LC responders send majority (59 percent) of their total responses to own-caste grooms, this clearly refutes the supply side account. The same line of reasoning applies to responders from other castes as the case may be.

One may also argue that a strategic consideration may explain why responders of a given caste group show an increasing preference for higher income grooms who belong to their own caste. The alleged effect may operate in the following manner. Since in a country like India the high-income population constitutes a small proportion of the total population, and then assuming that the low-income population constitutes a large proportion of the total population of each caste group in West Bengal, a strategic behavior would imply that the largest share of intra-caste responses should go to the LI grooms<sup>23</sup>. This response behavior would presumably enhance the probability of finding a

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<sup>23</sup> Even though we assume that low-income population constitutes a large fraction of the total population of each caste group in West Bengal, in light of the scantily available data it does not appear to lie far from the reality. According to the UNDP Human Development Report, 2007-08, India's Gini index was 36.8 in 2004-05; the richest 20 percent population account for 43 percent of the national income and the poorest 20 percent receive only 8 percent of the national income. This skewed distribution indicates that 80 percent of the country's population share only 57 percent of the country's income, which suggests that a small proportion of the population belong to the high income group. Since income data by caste groups are not available, we refer to these national income figures, which can provide a rough picture of the overall income distribution prevailing in the country.

match for a responder. However the trend in the data contradicts this strategic response. In contrast we observe that the HI groom in each caste group receives the highest number of responses from their own caste. Thus supply side arguments cannot explain the intra-caste response patterns found in the data.

### 3.3 *The Inter-Caste Responses*

In order to shed light on the main hypothesis of this study, we focus on the inter-caste responses. We distinguish between two possible types of inter-caste responses: one in which a higher-caste responder replies to a potential lower-caste groom, and the other in which a lower-caste responder replies to a potential higher-caste groom. The distinction is important as incentives differ in each direction. Recall that a lower-caste female would experience a gain in caste status by marrying a higher-caste male, while a higher-caste female would experience a loss in caste status by marrying a lower-caste male. Thus an asymmetric incentive structure prevails for different caste groups so far inter-caste mobility is concerned.

While there exists a universal consensus regarding strict own-caste preference in Indian marriage markets (Anderson, 2003), our data is largely at variance with this observation. Despite the evidence in favor of strong own-caste preference, we find that a significant proportion of responders (approximately 41, 58, and 41 percents of HC, MC and LC responders respectively) reply to grooms outside their own caste. We first concentrate on the responses that are sent from the upper strata of the caste hierarchy. Approximately 24 percent of all HC responses go to MC grooms, and 17 percent to LC grooms; thus HC responders on average display greater willingness to marry a MC groom than marrying a LC groom. Given the status of each caste in the caste hierarchy,

this is quite intuitive. Furthermore responses from HC group diminish steadily as the income of a lower-caste groom decreases (see 2<sup>nd</sup> & 3<sup>rd</sup> rows of Table 2A). MC responders in contrast send 31 percent of their total responses to LC grooms. Responses from MC group also gradually decrease as the income of a LC groom goes down (see 3<sup>rd</sup> row of Table 2B). While theoretically there remains no reason for HC and MC responders to reply to lower-caste advertisements, we find that responders of these caste groups are actually willing to select a mate from lower-caste groups, moreover higher the income of a lower-caste groom higher the number of responses from higher-caste responders. In sum, these observations might indicate that higher-caste responders are willing to trade off their caste status for higher incomes of potential grooms, i.e., they are ready to accept a loss in the caste status by expressing their willingness to marry a lower-caste groom with considerably higher than average income.

Could supply side effects explain these response patterns in the data? One potential argument could be the following. Assume that the respective shares of HC and MC groups in the state population are higher than that of LC group, and therefore responses from these groups merely reflect their large presence in the market and do not necessarily mirror their preference for potential lower caste grooms with higher incomes, as we argue. Granted this, why these responders respond in a fashion that reveals their greater sensitivity to higher incomes of such grooms? One may still make a case that since higher income is known to positively correlate with liberal attitudes, then having realized this higher-caste responders apply in greater numbers to potential lower-caste grooms with higher income, simply to increase their likelihood of acceptance. However if this were true then in principle that should also affect the response behavior of lower-

caste responders when they reply to potential higher-caste grooms. A close inspection of 1<sup>st</sup> row of Table 2B and 1<sup>st</sup> & 2<sup>nd</sup> rows of Table 2C reveal that lower-caste responses actually decrease as income of a potential higher-caste groom rises; hence a contradiction. Thus, we conclude that higher-caste responses mostly reflect preference for potential lower-caste grooms with higher earnings.

Shifting focus to the inter-caste responses from lower-caste groups, we find that approximately 27 percent of all MC responses and only 11 percent of all LC responses go to HC grooms, whereas 30 percent of all LC responses are directed towards MC grooms. Thus LC responders on average display greater willingness to marry a MC groom than marrying a HC groom. Again, this may be a sheer reflection of the caste hierarchy. Furthermore there exists an inverse relationship between the number of lower-caste responses and the income of a higher-caste groom (see 1<sup>st</sup> row of Table 2B and 1<sup>st</sup> & 2<sup>nd</sup> rows of Table 2C). Thus lower-caste responders also respond to the income incentives provided by potential higher-caste grooms, but unlike their higher-caste counterparts. In sum, these findings might indicate that lower-caste responders are prepared to tradeoff their preference for higher incomes of potential grooms (evident from the intra-caste responses) for a gain in the caste status by expressing their willingness to marry a higher-caste groom with lower income. Thus, inter-caste responses show evidence of willingness to trade off caste status with groom income that exists on both sides of the market.

#### 3.4 *Estimates of Caste-Income Trade offs*

Having discovered remarkable evidence of trade-offs between caste and income attributes in our data, we answer a question that is natural to ask at this point, i.e., how

much additional income does a potential lower-caste groom need to earn in order to compensate a higher-caste female for her loss of caste status, given that a higher-caste female is willing to marry down the line of caste? This question can also be re-phrased in the following manner appropriate in our context. How much additional income a groom of caste  $i$  and income  $j$  must earn in order to receive that many responses from responder caste group  $k$  as received by a groom of caste  $k$  and income  $j$  from the responder group  $k$ , where  $k$  denotes a higher caste than  $i$ , fixing the other characteristics of these two grooms which is true in our design?

We estimate these additional income figures for each of the three possible  $\{k, i\}$  pairs in our design based on the observed *average income sensitivity* of caste  $k$  responder group, where the average income sensitivity for a group is defined as the change in the number of responses from caste  $k$  responders as the income of a potential groom from caste  $i$  varies from LI to HI. In other words, how many additional responses on average a LC groom receives from HC responders as that groom's income increases from Rs.7000 to Rs.35000 in our design. The sensitivity figures for HC responders with respect to potential MC and LC grooms are 1.61 and 1.64 respectively, while the same for MC responders is 1.11 with respect to potential LC grooms. How to read such a figure? For example, for every Rs. 1000 increase in income of a LC groom expects to receive 1.64 additional responses from HC responders. Somewhat unintuitively, on average a MC responder increases responses by a smaller number than a HC responder to every Rs. 1000 increase in income of a LC groom, while one would expect the opposite.

Table 3 presents the income estimates for the three possible pairs. Based on these trade-off estimates several important observations can be made. First, these estimates in

general indicate prevalence of strong own-caste preference and enormous economic incentives are needed to overcome this preference. For example, a LC groom with LI needs an approximate additional income of Rs.49,300 in order to receive the same number of responses from HC responders as received by a HC groom from HC responders with the same income feature (see Panel A). Note that this additional income requirement is more than seven times than LI. Second, an element by element comparison of income figures between Panels A and B suggest that LC grooms require larger increments in income than those of MC grooms to compensate a HC responder for her potential loss of caste status. This result may be attributed to the fact that in the social hierarchy LC is ranked lower than MC, which in turn implies that the loss in social status of a HC female for marrying a LC groom is larger than the loss associated with marrying a MC groom. Hence, LC grooms need to compensate more than MC grooms. Following a similar argument, one can understand why LC grooms need to compensate a MC responder less than they need to compensate a HC responder (compare figures in Panels A and C). Third, the compensation amount provided by a potential lower-caste groom to a HC responder gradually falls as the monthly income of such a groom rises. However the trend is completely reversed in case of LC grooms when they compensate MC responders. We do not have a well-grounded explanation for the latter effect.

To sum up, these estimates indicate that economic incentives (in terms of increased income) offered by potential lower-caste grooms have to be substantial in order to overcome the strong own-caste preference in Indian marriage markets, and larger the social gap (determined by the caste hierarchy) between the two caste groups the larger is the amount of income required by lower-caste males to compensate for the loss of caste

status of higher-caste females for making the latter group willing to consider the former group as potential grooms.

Another trade-off arises when lower-caste responders reply to higher-caste grooms. A similar question about the trade-off is: what is the magnitude of potential groom income that a lower-caste responder is willing to forgo by not marrying an own-caste groom, and instead expressing willingness to marry a higher-caste groom with lower income? In order answer this we would need to observe a counterfactual. What is the highest plausible groom income that would cause a lower-caste responder with *given* characteristics to respond to own-caste grooms? If one knows this and also observes a lower-caste responder with similar characteristics actually responding to a higher-caste groom with certain income level, then one could estimate the magnitude of income forgone by a lower-caste responder. However our design cannot afford such data, and therefore we cannot answer the question raised above.

### 3.5 *Other Matrimonial Characteristics*

Apart from caste, each response supplies information about several other characteristics of a girl and her family. This additional information will enable us to understand better why some of the higher-caste responders are willing to step down the line of caste and why some of the lower-caste responders are eager to move up the caste ladder. Tables 4-8 present the distribution of some selected attributes. Parts A to C of each table present the distributions by three responder caste groups.

The data on characteristics that are viewed as advantageous for a potential bride from the standpoint of a marriage market (like *employment status*, *education level*, *very fair complexion*, and *very good looks*) reveal interesting patterns. The last column of each

of the Tables 4, 5, 6, and 7, reveal that higher the groom caste, the higher is the share of responses with the respective attribute. Similarly, we observe that higher the groom income, the higher the share of responses that possess these attributes (see the last row of each of the Tables 4, 5, 6, and 7). *Home or apartment ownership*, an indicator of family wealth, also depicts similar trends (see Table 8). Thus the aggregate data on these characteristics suggest that grooms with higher caste and higher income receive proposals from responders with superior bridal and familial attributes. While this trend is interesting in itself, disaggregating the aggregate data by responder caste for each characteristic can unearth whether these patterns hold true for each responder caste group.

The disaggregated data reveal that the share of HC responses, possessing each of the above desirable characteristics, decreases with declining caste status (see the last column of each of the Tables 4A, 5A, 6A, 7A, and 8A). Holding constant groom income, the same response pattern is observed (see the 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> columns of each of the Tables 4A, 5A, 6A, 7A, and 8A)<sup>24</sup>. Additionally share of HC responses, with these positive attributes, goes up with the rise in groom monthly income (see the last row of each of the Tables 4A, 5A, 6A, 7A, and 8A), and again, this trend holds while groom caste is held constant (see the 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> rows of each of the Tables 4A, 5A, 6A, 7A, and 8A). What do these patterns imply? This broadly means that on average HC responders who possess these superior bridal and familial attributes respond in lower proportion to lower-caste and lower-income grooms.

How do MC responders fare compared to their HC counterparts? We find that the share of MC responses, with each of these positive attributes, is higher when they apply

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<sup>24</sup> With a minor exception of ‘Very Good Looks’.

for HC grooms than when they apply for own-caste grooms. Strikingly, the share of MC responses is lower when they apply for LC grooms than when they apply for own-caste grooms (see the last column and the last row of each of the Tables 4B, 5B, 6B, 7B, and 8B)<sup>25</sup>. This implies that on average MC responders who possess these superior matrimonial attributes respond in higher proportion to HC and HI grooms and vice-versa.

Compared to HC and MC responders, LC responders exhibit a different pattern. LC responders with these attributes send the largest proportion of their responses to their own-caste grooms and the second largest of the responses go to MC grooms<sup>26</sup>. Furthermore, own-caste LC responses rise with the rise in groom income (see the second-last row of each of the Tables 4C, 5C, 6C, 7C, and 8C). These regularities in the data imply that LC responders with these qualities perhaps prefer own-caste grooms with higher income, and distribute the responses accordingly.

From these trends we can infer that higher-caste responders with positive attributes are less willing to marry a lower-caste or a lower-income male. But they are ready to marry down the caste line only for lower-caste grooms with higher income. While MC responders with these attributes are more willing to marry HC grooms, LC responders with positive attributes, on the other hand, are less willing to marry a higher-caste male. Hence the data suggest that there exists a constellation of factors such as caste status, groom income, and marital characteristics of brides that may have given rise to observed patterns.

#### **4 Conclusion**

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<sup>25</sup> With the exception of the attribute 'Employed Bride'.

<sup>26</sup> The only exception is 'Master's Degree' for which they send the largest proportion of responses to MC grooms.

This study serves an important purpose in understanding the interactive relation between discriminatory preference underlying the search for a potential mate and economic incentives. Compared to the prior literature that uncovers a set of determinants of inter-group preferences in marriage markets, our study advances this understanding by exploring the impact of an enormously essential determinant of mate selection (i.e., income) on such preferences.

To investigate this question, we conduct a field experiment in a reputable matrimonial market in India. Existing marriages in India are claimed to exhibit a strong sorting along the caste line where caste of an individual is a proxy for statistical discrimination and a parameter of social status. We choose three distinct caste groups and three notably different monthly income figures, and construct advertisements for nine distinct grooms who differ either in monthly earnings (within a caste group) or in caste status (across a caste group), while controlling other characteristics. We post these advertisements in two different editions of a Bengali language newspaper with sufficient time gap; measure responses from prospective brides' families for each groom type, and thus cast light on the research hypothesis.

There are two major findings. First, each caste group in our study exhibits a strong preference for in-caste grooms and thereby discriminates against grooms from the other two castes, despite the fact that both groom types possess the exactly same set of attributes. Second, economic incentives in terms of higher incomes of lower-caste grooms have the potential to bend the biased preferences of upper caste females.

How do the existing theories of inter-group marriages account for these results? We discuss a prominent and the most well known theory in sociology - social exchange

theory (Merton, 1940). Specifically, we discuss the relevance of this model with a focus on the inter-caste marriage response data that our experiment yields.

The social exchange theory postulates that an individual in a marriage market is represented by a set of characteristics (height, gender, caste, income, age, job, and so on). These characteristics determine the value of an individual in a marriage market, and also the social cost of marrying an individual with such characteristics. Coupled with this, if one assumes that there is a cost (benefit) for higher-caste (lower-caste) females for marrying someone from lower-caste (higher-caste), then the predictions of this model succinctly capture key elements of inter-caste response data.

For example, since *Brahmins* are at the top of the caste hierarchy, inter-caste marriage will always come at a social cost to a female from this caste. According to the social exchange theory, in equilibrium a *Brahmin* female must be compensated for her loss of caste status by intermarrying with a lower-caste male who either has higher than average earnings or possesses superior other matrimonial attributes. Similarly, a *Namasudra* (placed at the bottom of the caste hierarchy) female who gains caste status by intermarrying with a higher-caste male must possess either superior attributes or forego some income, by plausibly not marrying a higher income own-caste groom, in order to compensate that higher-caste male. Thus, this theory predicts a trade between various characteristics and caste status.

We do not have data on final matches to directly test these predictions. However, the inter-caste response data from our experiment may indirectly shed some light. The data indicate that responses from higher-caste females increase monotonically with the monthly income figures of lower-caste grooms. This might imply that higher-caste

responders are attempting to compensate themselves by applying for lower-caste grooms with higher income for their potential loss of caste status. This supports the prediction of the social exchange theory. However, the data does not provide support for the prediction that a lower-caste female who gains caste status by intermarrying with a higher-caste male possesses either superior attributes or foregoes some income.

Our study documents that the tools of field experiment can be effectively used to gain important insights into the mate selection behavior. With the help of this methodological tool, we are able to convincingly document that same caste marriages in India are the result of preferences, and both sides of the market share this preference. More interestingly, income of a potential groom can play a significant role in dominating biased preferences. However income is just one of the many vital determinants of mate selection, and this study takes a small but crucial step towards understanding the impact of only one such determinant on inter-group intimacy. One could potentially think of imitating the approach taken by this study to identify impacts of a host of similar important determinants.

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**Table 1A Summary Statistics of Selected Variables Based on Collected Advertisements**

	Aggregate	HC	MC	LC
<b>Income (Rs.)</b>				
Obs.	1261	527	375	359
Mean	15858.45	17231.5	16714	12949.16
Std. Dev.	9893.77	8375.99	12316.67	8421.84
Min	2000	4500	2000	3500
Max	50000	40000	50000	50000
<b>Age (Years)</b>				
Obs.	2776	1368	768	640
Mean	31.75	32.07	31.33	31.56
Std. Dev.	4.27	4.35	4.38	3.88
Min	22	22	23	24
Max	50	46	50	43
<b>Height (Feet.Inches)</b>				
Obs.	2777	1368	768	768
Mean	5.47	5.44	5.54	5.35
Std. Dev.	0.31	0.31	0.32	0.30
Min	4.1	4.1	4.1	4.1
Max	6.2	6.1	7.5	6.2

**Table 1B Summary Statistics of Selected Variables Based on Collected Advertisements**

	Aggregate	HC	MC	LC
Govt. Job	2220 (79.94)	1100 (80.41)	591 (76.95)	529 (82.53)
PO Box	1529 (55.06)	802 (58.63)	381 (49.61)	346 (53.98)
Caste No Bar	104 (3.75)	45 (3.29)	15 (1.95)	44 (6.86)
Income Mentioned	1261 (45.41)	527 (38.52)	375 (48.83)	359 (56.01)
Looks Mentioned	1619 (58.30)	779 (56.94)	406 (52.86)	434 (67.71)
Education Not Mentioned	571 (20.56)	275 (20.10)	196 (25.52)	100 (15.60)

Figures in parentheses denote percentage

**Table 2 Total Number of Responses Received by Different Groom Types**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	140	126	146	412
	MC	159	114	82	355
	LC	178	101	77	356
Total		477	341	305	1123

**Table 2A Distribution of Responses from HC Group (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	23.01	17.78	17.99	58.79
	MC	13.81	6.07	4.39	24.27
	LC	10.67	5.23	1.05	16.95
Total		47.49	29.08	23.43	100.00

Total number of responses from HC = 478

**Table 2B Distribution of Responses from MC Group (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	7.22	9.09	10.43	26.74
	MC	22.19	12.30	7.75	42.25
	LC	15.51	8.29	7.22	31.02
Total		44.92	29.68	25.40	100.00

Total number of responses from MC = 374

**Table 2C Distribution of Responses from LC Group (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	1.11	2.58	7.75	11.44
	MC	3.69	14.39	11.81	29.89
	LC	25.46	16.61	16.61	58.67
Total		30.26	33.58	36.16	100.00

Total number of responses from LC = 271

**Table 3 Caste-Income Trade-off Estimates when Higher-Caste Responders Respond to Lower-Caste Grooms**

Responder Caste	Groom Caste	Groom Income	$\Delta$ Income ('000 Rs.)
<i>Panel A</i>			
HC	LC	7000	49.3
HC	LC	15000	37.1
HC	LC	35000	35.9
<i>Panel B</i>			
HC	MC	7000	40.4
HC	MC	15000	34.8
HC	MC	35000	27.4
<i>Panel C</i>			
MC	LC	7000	1.8
MC	LC	15000	13.6
MC	LC	35000	22.6

Notes:

i. Each  $\Delta$ Income figure denotes the magnitude of additional income that a groom of  $i^{th}$  caste and  $j^{th}$  income needs in order to receive as many responses as a groom of the responder's own caste with  $j^{th}$  income received. For example, the LC groom with Rs.7,000 needs an additional income of Rs. 49,300 to get as many responses from HC responders as the HC groom with Rs.7000 received from HC responders in our data.

ii. These estimates are based on average income sensitivity figures.

**Table 4 Distribution of Responses with ‘Employed’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	23.44	17.19	13.54	54.17
	MC	10.42	8.33	3.13	21.88
	LC	16.67	4.69	2.60	23.96
Total		50.52	30.21	19.27	100.00

Number of responses = 172; Percentage of total responses = 17

**Table 4A Distribution of HC Responses with ‘Employed’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	39.33	19.10	15.73	74.16
	MC	8.99	4.49	3.37	16.85
	LC	6.74	2.25	0.00	8.99
Total		55.06	25.84	19.10	100.00

Number of responses = 89; Percentage of HC responses = 19

**Table 4B Distribution of MC Responses with ‘Employed’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	17.31	25.00	13.46	55.77
	MC	17.31	1.92	0.00	19.23
	LC	17.31	3.85	3.85	25.00
Total		51.92	30.77	17.31	100.00

Number of responses = 52; Percentage of MC responses = 14

**Table 4C Distribution of LC Responses with ‘Employed’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	1.96	5.88	9.80	17.65
	MC	5.88	21.57	5.88	33.33
	LC	33.33	9.80	5.88	49.02
Total		41.18	37.25	21.57	100.00

Number of responses = 51; Percentage of LC responses = 19

**Table 5 Distribution of Responses with ‘Master’s Degree’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	20.10	16.79	16.28	53.18
	MC	14.76	9.92	5.09	29.77
	LC	10.43	5.34	1.27	17.05
Total		45.29	32.06	22.65	100.00

Number of responses = 393; Percentage of total responses = 35

**Table 5A Distribution of HC Responses with ‘Master’s Degree’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	36.41	20.65	17.39	74.46
	MC	11.96	3.26	1.63	16.85
	LC	7.07	1.63	0.00	8.70
Total		55.43	25.54	19.02	100.00

Number of responses = 184; Percentage of HC responses = 39

**Table 5B Distribution of MC Responses with ‘Master’s Degree’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	8.40	18.32	16.79	43.51
	MC	25.19	10.69	3.82	39.69
	LC	13.74	2.29	0.76	16.79
Total		47.33	31.30	21.37	100.00

Number of responses = 131; Percentage of MC responses = 35

**Table 5C Distribution of LC Responses with ‘Master’s Degree’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	1.28	5.13	12.82	19.23
	MC	3.85	24.36	15.38	43.59
	LC	12.82	19.23	5.13	37.18
Total		17.95	48.72	33.33	100.00

Number of responses = 78; Percentage of LC responses = 29

**Table 6 Distribution of Responses with ‘Very Fair Complexion’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	18.02	15.32	14.71	48.05
	MC	13.51	8.71	6.31	28.53
	LC	14.11	5.41	3.90	23.42
Total		45.65	29.43	24.92	100.00

Number of responses: 333; Percentage of total responses: 30

**Table 6A Distribution of HC Responses with ‘Very Fair Complexion’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	34.96	21.95	14.63	71.54
	MC	9.76	4.88	4.88	19.51
	LC	6.50	1.63	0.81	8.94
Total		51.22	28.46	20.33	100.00

Number of responses = 123; Percentage of HC responses = 26

**Table 6B Distribution of MC Responses with ‘Very Fair Complexion’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	12.50	15.63	15.63	43.75
	MC	24.22	7.81	0.78	32.81
	LC	16.41	4.69	2.34	23.44
Total		53.13	28.13	18.75	100.00

Number of responses = 128; Percentage of MC responses = 34

**Table 6C Distribution of LC Responses with ‘Very Fair Complexion’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	1.22	4.88	13.41	19.51
	MC	2.44	15.85	17.07	35.37
	LC	21.95	12.20	10.98	45.12
Total		25.61	32.93	41.46	100.00

Number of responses = 82; Percentage of LC responses = 30

**Table 7 Distribution of Responses with ‘Very Good Looks’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	19.51	18.29	15.85	53.66
	MC	9.76	6.10	4.88	20.73
	LC	15.85	3.66	6.10	25.61
Total		45.12	28.05	26.83	100.00

Number of responses = 82; Percentage of total responses = 7

**Table 7A Distribution of HC Responses with ‘Very Good Looks’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	38.89	25.00	19.44	83.33
	MC	5.56	0.00	0.00	5.56
	LC	11.11	0.00	0.00	11.11
Total		55.56	25.00	19.44	100.00

Number of responses = 36; Percentage of HC responses = 8

**Table 7B Distribution of MC Responses with ‘Very Good Looks’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	4.55	27.27	9.09	40.91
	MC	27.27	4.55	0.00	31.82
	LC	13.64	0.00	13.64	27.27
Total		45.45	31.82	22.73	100.00

Number of responses = 22; Percentage of MC responses = 6

**Table 7C Distribution of LC Responses with ‘Very Good Looks’ Bride (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	4.17	0.00	16.67	20.83
	MC	0.00	16.67	16.67	33.33
	LC	25.00	12.50	8.33	45.83
Total		29.17	29.17	41.67	100.00

Number of responses = 24; Percentage of LC responses = 9

**Table 8 Distribution of Responses with ‘Home or Apartment Ownership’ (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	20.97	11.94	15.16	48.06
	MC	11.94	7.74	5.81	25.48
	LC	14.19	6.45	5.81	26.45
Total		47.10	26.13	26.77	100.00

Number of responses = 310; Percentage of total responses = 28

**Table 8A Distribution of HC Responses with ‘Home or Apartment Ownership’ (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	40.68	19.49	15.25	75.42
	MC	6.78	4.24	2.54	13.56
	LC	6.78	3.39	0.85	11.02
Total		54.24	27.12	18.64	100.00

Number of responses = 118; Percentage of HC responses = 25

**Table 8B Distribution of MC Responses with ‘Home or Apartment Ownership’ (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	13.39	9.82	16.96	40.18
	MC	22.32	8.04	5.36	35.71
	LC	16.96	3.57	3.57	24.11
Total		52.68	21.43	25.89	100.00

Number of responses = 112; Percentage of MC responses = 30

**Table 8C Distribution of LC Responses with ‘Home or Apartment Ownership’ (%)**

Groom Income (Rs.)		35000 (HI)	15000 (MI)	7000 (LI)	Total
Groom Caste	HC	2.50	3.75	12.50	18.75
	MC	5.00	12.50	11.25	28.75
	LC	21.25	15.00	16.25	52.50
Total		28.75	31.25	40.00	100.00

Number of responses = 80; Percentage of LC responses = 30

**Figure 1 Distribution of Groom Income from the Collected Marriage Ads**

