Institutional development and the dowry death curve across states in India

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Abstract
Why do some informal institutions increase in prevalence while other informal institutions decline? We study why dowry deaths have increased with economic development in some Indian states but have decreased in others. We argue that when economic development is low, traditional institutions rather than state institutions govern behaviour. But as economic development increases to a high level, modern formal institutions replace traditional informal institutions. Women are increasingly exploited and murdered over dowry as incomes increase from a low level, but fewer deaths occur as incomes increase from a high level. We test this argument using a dataset of dowry deaths in years 2001–2011 for 32 Indian states and territories. Our paper contributes to understanding how exploitation through informal institutions rises and falls with economic development.

KEYWORDS
dowry, gender, informal institutions, India, economic development, human rights

1 INTRODUCTION

What explains heterogeneity in the existence of informal institutions? Why do individuals retain informal institutions even when they are particularly atrocious? Informal institutions are socially shared rules which are not enforced by the state (Helmke & Levitsky, 2004). Recognizing that informal institutions have gendered effects is necessary to...
understanding how social and economic change impacts people's lives (Mackay et al., 2010). Gendered informal institutions can be especially damaging to women's health (Sen & Ostlin, 2007). But the use of some informal institutions has increased in geographic areas while their use has decreased in other areas. For example, female genital mutilation has been declining at different rates in different geographic locations (Caldwell et al., 2000; El-Gibaly et al., 2002). The practice of dowry in India is such an informal institution that has been simultaneously increasing and decreasing in different locations that have both experienced economic development.

Scholars have developed several theoretical propositions to explain why the phenomenon of dowry has been increasing. Gendered differences in labour force participation and income may have contributed to the replacement of bride-price with dowry (Rajaraman, 1983; Sambrani et al., 1983). Becker's (1991) price model views dowries as transfers between families for hypergamy (women marrying up the social ladder) to equilibrate the marriage market. Other studies rationalize an increase in dowry as the consequence of population growth (Dalmia & Lawrence, 2005; Rao, 1993a). The dowry practice may have emerged to draw high-quality men into the marriage market due to a marriage squeeze, since men tend to marry younger women (Rao, 1993b). The increase in wealth dispersion within a caste group may have also caused dowry inflation (Anderson, 2003) and societal expectations often perpetuate the institution (Sonì, 2020).

Scholars have focused on the dowry practice in India to study social pressures because it is a particularly pernicious and salient issue that is a useful topic for gaining insight into how institutional and developmental changes impact behaviour (Roy, 2015; Sekhri & Storeygard, 2014). In this research, we seek to answer whether dowry murders are actually increasing with economic development in India, and if so, why? Scholars have commented for decades that in India, the practice of dowry has increased along with economic development (Agnihotri, 2003; Anderson, 2003, 2007; Basu, 1999; Epstein, 1973; Srinivas, 1984; Srinivasan, 2005), but we find such assertions have not undergone quantitative testing.

Moreover, while dowry deaths are increasing in some Indian states, they are decreasing in others, which presents a puzzle. Consider the Indian states of Bihar and Tamil Nadu which have had different experiences with dowry deaths in the past decade. Agricultural Bihar is a north-eastern state situated on the border with Nepal, while Tamil Nadu is a producer of textiles, automobiles and information technology that lies at the southernmost portion of the country where it borders the Indian Ocean. As shown in Figure 1, during the decade from 2001 to 2011, Bihar experienced rising dowry deaths beginning with 859 total cases reported (103 per 10 million people), and by 2011, the number of cases increased to 1413 (136 per 10 million). Alternatively, Tamil Nadu experienced a decline in dowry deaths during this period. In 2001, Tamil Nadu reported 191 total cases (31 per 10 million) but declined to 152 cases (21 per 10 million) by 2011.

There is a sizable difference in the total number of dowry murders between these two states—Bihar is one of the two states with the worst dowry deaths records. However, economic growth does not explain why dowry deaths are rising in Bihar but declining in Tamil Nadu since their average rates of economic growth are quite similar. In Bihar, the average growth in gross domestic product (GDP) per capita (GDPpc) was about 5% annually during the time period, and in Tamil Nadu it was about 6%. These similar rates of growth do not explain why dowry murders are increasing in one state but decreasing in another. Instead, we focus on the levels of economic development in each of these states.

Bihar in 2001 was a poor, rural state where the GDP in $US was $8.5 billion ($102 GDPpc). But Tamil Nadu was more developed with good infrastructure and a GDP of $21 billion ($343 GDPpc). Tamil Nadu’s GDPpc in 2001 was three times as large as Bihar’s, although both states increased their level of development over the next decade. We think that this provides insight into why dowry deaths are increasing in Bihar but are decreasing in Tamil Nadu.

The existing literature finds that dowry deaths are increasing with economic development, but the existing literature is unable to account for differences between states such as Tamil Nadu and Bihar because it tends to focus on national level comparisons. Prior studies often overlook differences between states. Our study builds on the literature by analysing relationships within the states of India. Moreover, our paper explains not only when dowry deaths increase but also when they decrease.
We argue that whether an increase in development leads to more or less dowry deaths within a state depends on whether the state is at a low or high level of development. Traditional institutions such as gender roles, weak state punitive institutions, and limited economic opportunities allow for a culture that supports the dowry practice. When incomes increase in these less developed areas, males reap the economic benefits which place females in positions of even greater powerlessness. However, as development further increases, gender inequity decreases; individuals have more financial security, and state institutions are more capable of enforcing dowry laws. It is at this higher level of development that further increasing economic development causes dowry deaths to decrease.

Our argument and finding contributes to the literatures on how informal institutions, formal institutions and economic development impact society particularly for gender equality. Informal institutions are necessary to coordinate behaviour in traditional or primitive societies but are complimented or replaced by formal institutions over the course of institutional transitions (North et al., 1990). Our study is an example of how gender helps explain the consequences of development and institutional transitions (Mackay et al., 2010; Waylen, 2014). Our theoretical framework applies especially to gender inequality but could also apply to other inequities in ethnic or minority rights.

Our research highlights how a process of modernization by which formal institutions replace informal institutions (Lipset, 1959) initially harms women through violence and economic exploitation but eventually benefits them.
by increasing gender equality and legal enforcement. The impact of this process on dowry murders resembles a Kuznet’s curve. Though the mechanisms differ, Kuznet’s curves have been found in income inequality, (Acemoglu & Robinson, 2002; Nielsen & Alderson, 1997), state stability (Huntington, 2006), environmental degradation (Stern, 2004) and gender inequality (Eastin & Prakash, 2013).

In the next section, we situate the problem of the dowry practice in India and provide a historical account of when it began to rise and spread. In the third section, we explain the growth and decline of dowry deaths in Indian states using a theory of economic development and institutional transition. In Sections 4 and 5, we present our research design and test our hypothesis with data on dowry deaths in 32 Indian states during 2001–2011. The sixth section discusses our findings and the potential generalizability of our model to how development impacts exploitation. We close with thoughts on anti-dowry policy in India.

2 | NATURE OF THE PROBLEM

Traditionally, dowry was a voluntary marriage gift from a bride’s family to the groom at the time of marriage. A precise chronology of the development of dowry is not available; however, the literature suggests that the dowry system was gradually institutionalized and expanded during the British period in India (i.e., 1857–1947 broadly) (Sheel, 1997; Srinivas, 1995). Over the course of time, the voluntary nature of the gift turned into compulsion for the parents of young daughters to make large payments to the grooms’ families in order for their daughters to marry. Additionally, dowries are increasingly being demanded after the time of marriage, where husbands’ families are extorting money from the wives’ families long after the time of marriage by threatening the life and physical safety of the wife. When the dowry is not paid, the husband or his family may beat, burn or murder the wife as a means of punishing her family for not paying.

Historically, dowry was recognized as streedhan, a form of women’s inheritance and female property (Goody & Tambiah, 1973, p. 86). Accordingly, a common justification for dowry is that it is a pre-mortem inheritance since women do not get any share of their fathers’ property (Sheel, 1999). In the absence of any inheritance, dowry has also been argued to be a pro-women institution (Kishwar, 1989; Oldenburg, 2002). Another point of view is that dowry was primarily a strategy to compensate for women’s shares of immovable property and land (Ahmad, 2003). Nonetheless, the contemporary dowry practice is a ‘cultural oxymoron that has no resemblance to the historical institution’ (Oldenburg, 2002, p. 98), and a bride rarely has any control over her dowry (Caplan, 1984; Sharma, 1984).

The practice of dowry was originally limited to the upper caste community of northern India (Kolenda, 1987; Miller, 1980), but today, dowry is practiced across regions, castes and classes (Kapadia, 1993; Srinivas, 1984). The caste system in India is a hereditary social ordering which historically prescribed an individual’s occupation and place in society. Numerous Indian communities that traditionally practiced bride-price have since switched to dowry, contributing to the rise of dowry demands (Rajaraman, 1983; Bhat & Halli, 1999, p. 129). A bride-price is when a groom or groom’s family provides a gift to the bride and her family, and both practices have historically occurred in India. In South India, the change from bride-price to dowry appears to have occurred first among the urban, educated Brahman caste and then spread rapidly to rural areas, among the lower castes, and to Christians and Muslims (Bradford, 1985; Caldwell et al., 1983; Caplan, 1984; Epstein, 1973; Ifeka, 1989; Rao, 1993b).

In various southern societies, ‘land devolves on women, as is particularly in evidence in the contrast between South and North India’ (Goody & Tambiah, 1973, p. 21). Consequently, ‘where a woman inherits land as an heir or as dowry, the division of land is prevented through close marriage and through uxorii or matrilocal postmarital residence’ (Srinivasan, 2005, p. 596). Land is an essential determinant of kinship/ marriage arrangements of cross-cousin marriage, virilocality and the continuation of a woman’s strong natal ties after marriage, which allowed women in South India greater autonomy compared to their northern counterparts (Dyson & Moore, 1983). These informal institutions of kinship patterns possibly account for a lesser number of dowry deaths in southern India. These kinship
arrangements and women's strong natal ties may also have a positive impact on formal institutions to minimize the cases of dowry deaths.²

According to a study conducted in South India, the average dowry equals approximately two thirds of a household's assets (Rao, 1993b). To avoid future impoverishment, some families prefer to eliminate a girl child through abortion of female foetuses. A recent report (Jha et al., 2006) in The Lancet, a British Medical Journal, indicates that around 10 million female foetuses may have been aborted in India over the past two decades by their families in an effort to avoid the expense of having a daughter. There is also an increased prevalence of mobile private sex determination clinics using ultrasound technology, which often provide abortion services (George, 1997). These mobile clinics display advertisements such as ‘Pay 50 Rupees now to save 50,000 Rupees later’ (Basu, 1999, p. 247).

As a result of these efforts, the female sex ratio in India is decreasing which may further lead to gender imbalance in the country (Sen, 1990).

Furthermore, research (Bloch & Rao, 2002; Srinivasan & Bedi, 2007) has shown that dowry leads to an increase in wife beatings and the physical and mental assault of women. Women have been assaulted because of the aspirations and greed of their in-laws to obtain more dowries from the brides’ families. Domestic violence against women is systematically used as a bargaining means to extract additional transfers (Bloch & Rao, 2002). Some women are killed, beaten or severely burnt by their in-laws if the family of origin fails to fulfil the dowry related demands of their in-laws. According to the Indian Penal Code (340B), a dowry death is defined as a death which occurs from unusual circumstances within 7 years after marriage and prior to death the wife had been harassed for dowry.

Though a few state laws preceded it, the Indian government implemented the Dowry Prohibition Act in 1961 to combat the dowry practice by criminalizing the gift or receipt of a dowry. The law requires a fine and a prison term of five or more years for anyone convicted of giving, receiving or aiding in the transfer of a dowry. Nevertheless, the legislation on its own was ineffective since there is significant sociocultural acceptance for the dowry practice and because of the low status of women in Indian society. To further bolster legal redress for marital-based crimes against women, the Indian government passed a law in 1983 to criminalize harassment of wives in which a wife is subjected to cruelty which may cause her harm or cause her to harm herself. Commonly known as the anti-dowry law, Section 498A of the Indian Penal Code provides for fines and imprisonment of up to 3 years for husbands or husbands’ family members who harass a wife or make illegal demands of her, such as dowry.³ Despite these criminal laws, the practice of dowry remains prevalent in contemporary society and is increasing in many Indian states.

3 | EXPLAINING THE SPREAD OF DOWRY IN INDIA

The existing literature argues that consumerism, increased purchasing power, common mass greed and a patriarchal mind-set are linked to the current awful face of dowry practices in India (Srinivasan, 2005). Scholars identify the theory of hypergamy as the main reason of the dowry practice (Blunt, 1931; Hutton, 1946; Risley, 1915) where family prestige is associated with marrying a daughter to someone of higher social standing. From an economic view, marriage is a joint venture that offers greater efficiency in household activity (Becker, 1991). The marriage payment is based on the economic value of each of the partners.

When an underdeveloped state economy grows, men are the primary recipients of the new economic opportunities, and women in contrast remain with less economic value and do not directly obtain the benefits of economic development (Anderson, 2007). Dowry payments may have emerged due to competition among homogeneous groups of girls for wealthy, and thus more desirable, grooms. As their incomes rise, males are able to demand more dowries because in the view of marriage as an economic contract they are worth.

The Indian practice of dowry may also be particularly salient because of the limitations on upward mobility presented by the caste system. Individuals are limited or unable to improve their social status beyond their caste by simply increasing their wealth through income. Individuals within a single caste have similar social statuses, and
Dowries are a means of gaining social status that will differentiate a family from, at least, other members of the caste. Add economic development to this situation, and the increased earning potential of men with similar social statuses explains dowry inflation since males with higher earning potential can demand higher dowries.

If the increased incomes of males in India are sufficient to explain increases in dowry payments, and thereby dowry deaths, then we should expect that states with higher per capita income also have higher rates of dowry deaths. Figure 2a,b indicate the average dowry deaths per 10 million people and its growth during the 2001–2011 time period. Figure 2c,d are GDPpc and its growth for the same time period. In comparing Figure 2a,c, there is a clear clustering of states in the northeast which have high rates of dowry deaths and low income per capita. This associates low economic development with the occurrence of dowry deaths, but this simple comparison cannot explain how changes in incomes impact dowry practices. A comparison of the average growth rates in Figure 2b,d do not provide any clear relationships. To find an economic explanation for dowry deaths, we are going to have to dig deeper.

**Figure 2** Average dowry deaths per 10 million and GDP per capita, by level and growth.

Note: The currency for GDP in Figures 2c and 2d are in thousands of rupees (constant 2004). Figures 2b and 2d are in percentages. All data are from 2001 to 2011 (GOI MHA, 2015; GOI ORGCC, 2015). The categories are quartiles [Colour figure can be viewed at wileyonlinelibrary.com]
3.1 Economic development and institutional transition

We argue that economic development impacts dowry practices by multiple related mechanisms. First, employment opportunities increase as the local economy develops, but initially, males are the primary beneficiaries of development. Second, as employment increases, so do incomes, which in turn cause the price of dowry demanded to increase. Third, economic development causes modern formal institutions to replace traditional informal institutions, thereby increasing enforcement of dowry crimes. These mechanisms are not independent, and how they impact dowry practices depends on the level of economic development.

Before proceeding, we define informal and formal institutions. Informal institutions are particularly difficult to define. They are ‘conventions that solve coordination problems’ but are not intentionally created by a governing authority (North et al., 1990, p. 41). Informal institutions may be found in both underdeveloped and developed societies, but the latter also has formal institutions. In our argument, we refer especially to the informal institution of gender roles in which men are expected to work in wage labour and women are expected to work in the home.

Defining formal institutions is much simpler. Formal institutions are intentionally constructed rules that govern behaviour, often with codified consequences for abrogating the rules. It is easier to observe these rules because they are typically written down in constitutions, laws and statutes. The formal institution in our argument consists of laws against dowry and in particular, the law against dowry deaths in the Indian Penal Code. These are state institutions that not only proscribe behaviour but also account for the punishment of violating the law.

In poor areas of India, just as in poor areas throughout the globe, employment opportunities are scarce. But as the local economy develops, the number of jobs available increases. However, in India, it is often socially unacceptable for women to work for wages, especially in poor areas in which the traditional institution of gender roles are prevalent. This means that males are the primary beneficiaries of increasing employment, especially in poor areas. How much the wife and family benefits from an improved local economy depends on how much wealth the male decides to share with his family. Often, men prioritize spending on their personal consumption rather than on their families (Thomas, 1990).

As development increases the availability of employment, wages also increase. Again, this is primarily benefiting males, especially in poorer areas where traditional institutions deter women from wage labour. As discussed above, increasing a male’s income increases his bargaining power in an economic contract view of marriage. This means increasing a male’s income increases the price he and his family will demand for dowry. Women and their families may not be able to meet the dowry demand as the price increases. This dynamic will increase dowry murders when incomes rise in poor areas in which traditional institutions are strong.

When development is higher, traditional institutions of gender roles are less important than when development is lower. There are instrumental reasons why this is so. When there are very little means of financial security, specialization of labour within the family and reliance on familial ties for economic security are very important. But as economic opportunities increase and incomes rise, the necessity of traditional family roles decreases in importance. Part of the reason is that services are more widespread and can be purchased rather than completed by the individual family member. Another reason is that individuals become more financially independent from their families, which further decreases social pressures to maintain traditional institutions.

When women are allowed to work, they gain personal financial freedom and increase their bargaining leverage in the economic contract of marriage. Rather than a daughter’s family paying another family to provide a good life for her, the daughter may enter the marriage as a wage-earner. Increasing economic opportunities when economic development is already high further decreases the pressure on the dowry practice by changing the nature of the marriage as an economic contract. This is not to say that only employed wives avoid dowry demands, but rather as incomes rise, gender inequity decreases and husbands’ families’ economic calculations change. This represents the replacement of a traditional informal institution of gender roles with a modern informal institution of gender equality.
When formal state institutions are weak and informal institutions of gender roles are strong, families have incentive to keep their daughters in marriages, even bad ones in which the daughter may be at risk. This is because of the taboo of divorce in traditional settings in India. A girl that divorces her husband is not marriageable to other males, and traditional values dictate that unmarried girls bring dishonour to their families. However, in higher income areas, divorce is becoming more common and acceptable, just as it is becoming more acceptable for women to participate in employment.

Further, development increases modern formal institutions which replace traditional informal institutions. State institutions of law enforcement and courts become stronger, and more able to impact citizens' lives because of the increased economic resources available due to higher development. This means that a family threatening to, or carrying out, the murder of a young wife as a means of extorting money from the girl's family are more likely to be punished for their actions. When development is low, these state institutions are weaker and dowry murders are more able to go unpunished.

Figure 3 provides evidence of the conditions which undergird these mechanisms. In Figure 3a, the percentage of women who are in the workforce is quite low when economic development is low. These data reflect the women in

**FIGURE 3** Female employment and dowry trial completion increase with development. Note: GDP per capita is in thousands of rupees (constant 2004) from 2011. Worker data are from 2011 and dowry trial cases completed are from 2013 (GOI MHA, 2019) [Colour figure can be viewed at wileyonlinelibrary.com]
the workforce as a percentage of all women in each state for which data are available. Increasing incomes in low levels of development benefits males more than females. But the percentage of women in the workforce increases as economic development increases which means economic benefits become more widespread. In Figure 3b, the percentage of dowry cases in which trials are completed in each state also increases with the level of economic development. State institutions can only be effective at enforcing dowry laws if dowry trials are successfully completed. These data suggest that the informal gendered institutions and formal state institutions change with development in ways consistent with our argument.

We may now establish our hypothesis of how economic development relates to dowry murders:

Economic development hypothesis: Increasing economic development from a low level is associated with increases in dowry deaths, but increasing economic development from a high level is associated with decreases in dowry deaths.

In this section, we constructed a theory of how economic development impacts institutional transitions and dowry deaths in India. In the next sections, we detail our research design and provide the results of our statistical analysis. While much of the work on dowry deaths has been qualitative or informally observational, we utilize quantitative data from the Government of India to test our hypothesis.

4 | RESEARCH DESIGN

We test our hypothesis with an Indian state-year panel data set from 2001 to 2011. Our sample includes 32 Indian states and union territories. We employ ordinary least squares (OLS) with a lagged dependent variable (LDV) to control for dynamic processes and Indian-state fixed effects (FE) to test within-state variation. We employ multiple specifications such as varying the time period of the dependent variable, including a spatially LDV with spatial errors, and limiting the sample to states with at least three million people which eliminates states that never record dowry deaths. The specification of our base model is

\[
dowry_{it+k} = \phi_1 dowry_{it-1} + \gamma_1 GDP_{it} + \gamma_2 GDP_{it}^2 + X_{it}\beta + \alpha_i + \epsilon_{it}
\]  

where \(i\) is the Indian state, \(t\) is the year, \(k\) ranges from 1 to 3 to allow for changes in economic factors to impact behaviour, \(X\) is a matrix of covariates including a constant, \(\beta\) is a vector of coefficients, \(\alpha\) are Indian state-effects, and is an error term.

4.1 | Data

The data are collected from the Census of India, the Open Government Data Platform India which is an online repository of government information hosted by the Indian government, and Indiastat.com which is another online warehouse for Indian government data. We collect data from multiple government agencies based on availability, including from the Ministry of Home Affairs (MHA), the Ministry of Statistics and Program Implementation (MSPI) and the Census of India which is an office within the MHA.

The dependent variable in each of the models is the number of dowry death cases reported in each state, per 10 million people. A women’s dowry death case is defined by the Indian Penal Code as a death from a dowry dispute. The number of people in each state or territory in the sample varies widely, with a minimum of 356,152 people, a maximum of about 190 million, and a mean of about 34 million. Dividing dowry deaths by 10 million
creates a rate of dowry deaths that is comparable across states of diverse sizes. Data for dowry deaths are from the Government of India (GOI MHA, 2015).

Our independent variables are the logged real GDPpc and its square (GOI MSPI, 2015). This allows for nonmonotonic relationships between GDPpc and dowry deaths. The currency for GDP is measured in Indian Rupees (constant 2004).

Control variables include state-level institutional, economic, demographic and other crime controls which influence dowry deaths and the economic development. The economic control variable is the GDPpc growth rate for each state, which is the percent change in GDPpc from 1 year to the next (GOI MSPI, 2015). Economic growth controls for changes in the economy, relative to the size of the economy in the prior year. Since our argument pertains to changes in the level of development, and these variables are necessarily correlated, controlling for growth better discriminates the impact of the level of development. Economic growth may also impact dowry demands by short term fluctuations in individual income.

Demographic control variables include percent literate population, percent urban population, percent female of rural population, percent female of urban population and sex ratios (GOI ORGCC, 2015). Each of these demographic variables are from 10-year census data, where the between years are linearly interpolated. Illiteracy and the urban/rural divide might limit economic opportunities and pressure families to make dowry demands. We control for marriage market pressures and labour supply by the proportions of females in rural and urban populations and additionally, following Rao (1993a), by the sex ratio of females (age 15–19) divided by the number of males (age 20–24).

We also control for patterns of social behaviour that likely correlate with dowry practices and that may impact economic development. We measure corruption crime cases registered per 10 million people as determined by the anti-corruption departments under the Prevention of Corruption Act and related sections of the Indian Penal Code (GOI MHA, 2015). We measure crimes against women which are the number of incidences of crimes against women per 10 million people. Crimes against women include rape, kidnapping, murder, spousal abuse, molestation, sexual harassment, human trafficking, sati (widow burning), soliciting prostitution, indecent representation of women and dowry (GOI MHA, 2015). States with greater corruption or crime rates may enable more dowry deaths by failing to hold perpetrators accountable. Corruption and crime rates also inhibit economic development.

We include a dummy variable for inheritance laws, where the variable is equal to 1 for all states in 2005 and after, and 0 otherwise. However, the inheritance laws variable is equal to 1 for all years for the states of Kerala, Andhra Pradesh, Tamil Nadu, Maharashtra and Karnataka since each had inheritance laws before 2001 when the sample begins. Inheritance laws are meant to reduce the dowry practice by prohibiting parents from gifting their daughters’ inheritance at the time of the wedding (Roy, 2015). This controls for potential spurious correlations between dowry deaths and economic development which might be due to the time period.

Lastly, we include a year time trend as a means of controlling for potential reporting bias due to reduced state capacity. In underdeveloped areas, reporting on deaths is more difficult. As the underdeveloped regions begin to grow economically, the capacity for the government to monitor dowry deaths increases. This could yield a downward bias on dowry deaths at the earliest stages of development. A year time trend is included to capture this potential bias. The descriptive statistics for the data is presented in Table 1 below.

5 | STATISTICAL RESULTS

The results of the statistical tests of the economic development hypothesis are reported in Table 2. Both the (logged) GDPpc and GDPpc² coefficients are statistically significant at the 95% level in all models. The coefficient on GDPpc is positive and the coefficient on GDPpc² is negative which means that dowry deaths are increasing in GDPpc but at a decreasing rate. As shown in Figure 4, increasing GDPpc from a low level does increase dowry deaths, but at some point, the association becomes negative. This is consistent with our hypothesis.
Since the effect of increasing GDPpc depends on the level of GDPpc, we plot the results of Models 1 and 3 graphically in Figure 4. In Model 1, the lowest development levels are associated with about 28 dowry deaths per 10 million people, holding all other factors constant. When development is highest, the association is about 42 dowry deaths per 10 million people. Since increasing development at high levels decreases dowry deaths, we can expect better outcomes for more developed areas in the future. These comparisons are starker in Model 3 when smaller states are excluded. The predictions are 43 and 45 deaths for the lowest and highest levels of GDPpc, respectively, and 66 deaths at the maximum point of the curve.

The maximum point associated with GDPpc (log) in Model 3, where the marginal effect of increasing GDPpc becomes zero, is at about 10 GDPpc (log). This is towards the centre of the distribution, giving the plotted effect a nonmonotonic shape. At this point, the number of dowry deaths associated only with the level of economic development is 65.6 per 10 million people. According to the model, a state as large as Bihar (91.4 million people by 2005 population figures) would have 396 and 407 deaths associated with the lowest and highest levels of GDPpc, respectively, and 600 deaths at the maximum point of the curve. This is an increase of 204 deaths per year from the lowest point of development to the max point for a state as large as Bihar. This outcome would decrease by $-193$ deaths when development increases from the max point to the highest level of development, for a state of this size. The effect of economic development on dowry deaths within a state is substantial, even when controlling for other important factors.

The differences in the slopes at two points on the marginal effect curve for economic development are also different at statistically significant levels, indicating that the effect is curvilinear and not simply linear. The difference in slopes at the GDPpc (log) points of 9.5 and 10.5 for Model 1 is 23.9, with a $p$ value of 0.029, and in Model 3, it is 43.4 with a $p$ value of 0.002. These differences in slopes are statistically significant at the 95% level, indicating that the curves are statistically differentiable from a straight line.

In this section, we have demonstrated that quantitative evidence supports what scholars have observed and commented on in India for decades: that dowry deaths are increasing with economic development. However, this is only a portion of the full story. The results in Table 2 are evidence that economic development is associated with initial increases in dowry deaths, but at some point, along the development path, the number of deaths begins to decrease.

Our results are consistent with our economic development hypothesis. The evidence in Table 2 and Figure 4 suggest that economic development has a nonmonotonic relationship to dowry deaths and that this relationship is independent of inheritance laws, urbanization and changes in sex ratios, among other factors. Economic development initially contributes to, but eventually discourages dowry murders.

### TABLE 1 Descriptive statistics

| Variable                          | Mean   | SD.   | Min.  | Max.  | Obs. |
|-----------------------------------|--------|-------|-------|-------|------|
| Year                              | 2006   | 3.2   | 2001  | 2011  | 352  |
| Cases reported during the year    | 235.7  | 404.8 | 0     | 2322  | 352  |
| Dowry death cases per 10 million people | 44.1   | 39.9  | 0     | 135.7 | 352  |
| GDP per capita (thousands of rupees) | 31.3   | 19.5  | 6.7   | 123.7 | 352  |
| GDP per capita growth             | 5.1    | 16    | −271.9| 76.2  | 348  |
| Population (millions)             | 35     | 41.1  | 0.4   | 199.8 | 352  |
| Literate population, percent      | 73.2   | 9.7   | 47    | 94    | 352  |
| Urban population, percent total   | 34     | 20.3  | 9.8   | 97.5  | 352  |
| Female rural population, percent rural | 48.4   | 2.1   | 38.3  | 51.9  | 352  |
| Female urban population, percent urban | 47.7   | 1.7   | 44.3  | 52.2  | 352  |

Abbreviation: GDP, gross domestic product.
# TABLE 2  Economic development predicts dowry deaths

|                        | (1) \( \text{Death}_{t+1} \) | (2) \( \text{SAC} \) \( \text{Death}_{t+1} \) | (3) \( \text{Pop} > 3 \text{ million} \) \( \text{Death}_{t+1} \) | (4) \( \text{Death}_{t+2} \) | (5) \( \text{Death}_{t+3} \) |
|------------------------|-------------------------------|--------------------------------|---------------------------------------------------|----------------|----------------|
| Temporal LDV           | 0.06                         | 0.03                          | -0.08                                             | -0.10         | -0.09         |
|                        | (0.09)                       | (0.08)                        | (0.07)                                            | (0.09)        | (0.09)        |
| GDP per capita (log)   | 245.79**                     | 264.38**                      | 434.95***                                         | 280.30***     | 250.22**      |
|                        | (115.75)                     | (114.85)                      | (134.15)                                          | (96.64)       | (97.46)       |
| GDP per capita (log)^2 | -11.93**                     | -12.74**                      | -21.72***                                         | -13.56***     | -11.90**      |
|                        | (5.22)                       | (5.17)                        | (6.10)                                            | (4.41)        | (4.43)        |
| GDP per capita growth  | 0.06***                      | 0.05***                       | -0.18                                             | 0.06***       | -0.02***      |
|                        | (0.01)                       | (0.01)                        | (0.15)                                            | (0.01)        | (0.01)        |
| Literate population, % | 0.94                         | 1.04                          | 0.21                                              | 1.05          | 0.48          |
|                        | (0.74)                       | (0.75)                        | (0.69)                                            | (0.74)        | (1.13)        |
| Urban population, %    | 0.06                         | 0.16                          | -0.40                                             | -0.07         | 0.15          |
|                        | (0.34)                       | (0.35)                        | (0.34)                                            | (0.37)        | (0.44)        |
| Female rural population, % rural | -1.16 | -0.31                          | 31.84***                                          | -1.74         | -13.89*       |
|                        | (5.19)                       | (4.93)                        | (5.68)                                            | (6.89)        | (7.91)        |
| Female urban population, % urban | 3.43 | 2.63                           | -0.09                                            | 3.68          | 8.61*         |
|                        | (3.68)                       | (3.61)                        | (3.68)                                            | (3.56)        | (4.63)        |
| Corruption cases, per 10 million | -0.01 | -0.00                          | -0.01                                            | 0.01          | -0.04         |
|                        | (0.03)                       | (0.03)                        | (0.02)                                            | (0.03)        | (0.03)        |
| Crimes against women, per 10 million | 0.00 | 0.00                           | -0.00                                            | -0.00         | -0.00         |
|                        | (0.00)                       | (0.00)                        | (0.00)                                            | (0.00)        | (0.00)        |
| Sex ratio (females 15–19, males 20–24) | 33.01* | 35.39**                         | 60.95***                                          | 31.29*        | 38.40**       |
|                        | (16.30)                      | (15.10)                       | (14.58)                                           | (16.70)       | (18.04)       |
| Inheritance laws       | -1.07                        | -0.71                         | 2.00                                              | -2.76         | 0.46          |
|                        | (3.10)                       | (3.64)                        | (2.00)                                            | (2.66)        | (2.28)        |
| Year                   | -0.51                        | -0.73                         | 1.07                                              | -0.32         | -1.11         |
|                        | (0.93)                       | (0.94)                        | (1.23)                                            | (0.97)        | (1.18)        |
| Spatial LDV \( \rho \) | -0.29                        |                               |                                                   |               |               |
|                        | (0.64)                       |                               |                                                   |               |               |
| Spatial error \( \lambda \) | 0.46                         |                               |                                                   |               |               |
|                        | (0.36)                       |                               |                                                   |               |               |
| Constant               | -419.98                      |                               |                                                   | -956.83       | 1146.43       |
|                        | (1429.14)                    |                               |                                                   | (1558.00)     | (2176.70)     |
| Observations           | 288                          | 288                           | 198                                               | 284           | 224           |
| Groups                 | 32                           | 32                            | 22                                                | 32            | 32            |
| \( R^2 \)              | 0.10                         | 0.15                          | 0.29                                              | 0.12          | 0.13          |

Note: The dependent variable in all models is dowry deaths per 10 million people, led by various years (see column headings). Model 2 is the spatial autocorrelation (SAC) model which is estimated by maximum likelihood, and the constant is suppressed. All other models are estimated by least squares. All models contain state fixed effects and heteroscedasticity robust standard errors clustered by state in parentheses. The sample for Model 3 is only states with populations above 3 million.

\*\( p < 0.1 \), \**p < 0.05\, \***p < 0.01.
It is troubling that dowry murders are increasing in some areas of India as economic development increases. Understanding the dowry practice in India is not only important to better understanding Indian society. The framework of our theory is highly generalizable. The theory exposes how differences in equity, minority rights and marginalized people can be exacerbated by economic changes. How economic changes impact social behaviour is conditional on local institutional contexts. Traditional hierarchical institutions create opportunities for exploitative behaviour, and economic incentives induce people to utilize hierarchical institutions for exploitation. Development initially encourages exploitation but eventually eliminates the traditional institutions used for exploitation.

In situations in which there is economic competition, dominant groups have incentive to take advantage of less powerful groups. This is why gender inequity, racism and minority rights are human rights issues—dominated groups are by definition less able to protect themselves and hold dominant groups accountable. We have discussed the issue of gender inequity in India, which is a major issue in many other cultures throughout the world, especially in
developing countries. But there are many other means of discrimination via informal and sometimes, even formal institutions.

The fact that deaths are increasing in underdeveloped regions in India suggests that policymakers have good reason to tailor anti-dowry programmes to poorer areas. Anti-dowry campaigns are already common in India on television public service announcements, and daytime soap operas contain anti-dowry themes. These are a means of communicating to the public, but television messaging will not penetrate isolated, rural and impoverished villages in India. As other scholars' and our findings suggest, when incomes begin to increase in the underdeveloped areas, then dowry problems really begin to grow.

The good news is that if economic development is causing dowry deaths, then development should provide governments with more economic resources to employ for combating dowry practices. But the additional economic resources of the government which are due to increased development are a reactionary form of policy since dowry deaths are also predicted to increase. This suggests that more needs to be done before development begins. Policy options for the Indian central and state governments include financing anti-dowry campaigns that increase local capacity for crime prevention and prosecution within underdeveloped communities.

This study builds upon the literature on dowry by offering a novel argument and quantitative tests at the state level. Subnational studies allow for arguments and tests that capture the heterogeneity within a country, and the states of India contain a wide degree of heterogeneity. However, a potential limitation of our study is that the states within India are quite large and have sizeable amounts of variation within their ethnic, cultural and economic compositions. Future studies of dowry might leverage data at the district or block levels to conduct even finer grain tests.

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AUTHOR CONTRIBUTIONS

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available for download from https://austin-mitchell.com.

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ENDNOTES

1 Indian currency is in 2004 prices and converted to $US at 2015 exchange rates only for this example.
2 Definitions taken from Agarwal (1994) and also cited in Srinivasan (2005, p. 610). Uxorilocal is where the husband takes up residence with the wife and (with or near) her parental family. Virilocal is where the wife takes up residence with the husband and (with or near) his parental family. Matrilocal residence is where the usual residence for most husbands is with or near the matrilineal kin of the wives. Patrilocal residence is where the usual residence of all or most wives is with or
near the patrilinial kin of their husbands. Endogamy is the preferred or prescribed practice of marrying within the defined kin group, be it clan, lineage, village or social class. The opposite principle is exogamy: the preferred or prescribed practice of marriage outside the kin group, the boundaries of which are often defined by the incest taboo (Marhall, 1994, p. 151).

3 Relatedly, an amendment in 2005 to the Hindu Succession Act of 1956 provides daughters legal rights to their family's inheritance, and this change of law may be further incentivizing fathers to provide dowry to their daughters in place of property (Rodrigue et al., 2013).

4 There are 36 total Indian states and territories. Four states are omitted because data are unavailable.

5 According to 340B in the Indian Penal Code, ‘Where the death of a woman is caused by any burns or bodily injury or occurs otherwise than under normal circumstances within 7 years of her marriage and it is shown that soon before her death she was subjected to cruelty or harassment by her husband or any relative of her husband for, or in connection with, any demand for dowry, such death shall be called “dowry death,” and such husband or relative shall be deemed to have caused her death.’

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