Labor Market Shocks and Evolution of Dowry Payments: Evidence from India

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Abstract

This paper examines whether current economic changes can influence traditional marriage institutions in India. I study if labour market shocks influence the size of bride-to-groom marriage payments, or dowries, in India. I exploit the 1991 trade liberalization reforms to investigate changes in female employment and earnings across districts in India and measure its impact on the size of marriage payments using a difference-in-difference identification strategy. Dowry payments decrease faster relative to the national trend in districts that are more exposed to trade reforms. The decline in dowry is explained by an improvement in economic position of women relative to men. I do not find evidence of other channels such as income effects of trade or changes in marriage market matching patterns as the operative force driving the decrease in dowry. By causally linking the economic potential of women to the size of marriage payments, this paper shows that changes in economic environment can affect cultural customs. It suggests a useful alternative to legislative ban on dowry which remains ineffective even today.

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1 Introduction

Historically, the tradition of bride-to-groom marriage transfers or dowry was prevalent in many parts of the world, including Renaissance Europe, but the practice declined with a significant increase in the earning potential of women, in these societies (Anderson, 2007a). In the contemporary world, dowries exist in present-day India, Pakistan and Bangladesh where the female participation in labour force continues to be low. In contrast, the marriage payments flow from groom-to-bride(bride-price) in certain Sub-Saharan African countries where females engage actively in the labour market (Figure 1). The emergence of marriage payments occurred in concurrence with the role of female labour, given the agricultural technology, in primitive societies[1]. Despite substantial modernization, the system of marriage payments has remained extremely persistent in certain societies and the labour market participation of men and women is still divided according to the traditional gender specializations (Alesina, Giuliano and Nunn, 2013). Therefore, it is important to examine if a change in the labour market role of females, today, can affect dowry payments or they have become too deeply entrenched in tradition to be affected by current economic changes.

In this paper, I use dowry payments data from India to examine whether a change in the economic potential of women can affect the persistent traditional institution of dowry. India provides close-to-ideal setting to examine this question. In India, female labour force participation continues to be low and dowry payments have been growing over time. Figure 2, shows the correlation between the evolution of real dowry payments in India and the working population ratio of women to men from 1950 to 1998. Dowry payments seem to be inversely correlated to the ratio of women to men in the labour market. I test this relationship causally.

Dowry payments from the bride's family to the groom's family form an integral part of marriages in India[2] and usually amount to several years of household income (Anderson, 2007b). Various studies have demonstrated how the custom of dowry alters the incentives of families to save, engage in sex-selection, in child marriage and domestic violence (Borker et al 2017, Bhalotra et al, 2018, Alfano, 2017, Bloch and Rao, 2002). Whilst, the importance of the earning potential of women as a channel that can affect the size of dowry payments, has been recognized in theory (Becker,1991, Boserup, 1970, Anderson, 2003, Anderson and Bidner, 2015), it still lacks consideration in the empirical literature. This is primarily due to the difficulty in isolating the effect of labour market outcomes on dowry as it is correlated with other variables, like educational investments, that are also valuable attributes in the marriage market. This paper addresses that gap in the literature.

[1] Boserup(1970), in particular, has argued that bride-price is found in societies in which agriculture relies on light tools (such as the hoe) and where women are actively engaged and dowry is found in societies where heavier plough agriculture is practised and women have a limited role (Anderson (2007)).

[2] More than 90 percent of the households in India, practice the custom of dowry at the time of marriage from 1980-1999. See Figure 3.

To resolve the problem of endogenous labour market earnings, I exploit the Indian Trade Liberalization reforms of 1991, that were externally imposed by the International Monetary Fund(IMF). The intensity of exposure to trade reforms varied across districts according to their pre-reform industrial composition. I exploit this across-district variation in trade to show that the position of women relative to men improved in the local labour markets. This evidence is used to motivate a two-period model that relates the economic value of women in the district to their quality in the marriage market.

In the model, the parents of the bride and the groom choose the educational investment of their off-spring in the first period. These investments determine their quality or expected labour market earnings in the second period, in the marriage market, where dowry is determined. The model provides a framework to understand the relationship between the size of dowry, relative returns to males and females in market and non-market activities, and their educational investments. The payment function is increasing in the quality of the groom and decreasing in the bride quality, which is equal to the sum of her expected labour market returns and her contribution to home production. The probability that she participates in the labour market is determined by district level economic conditions, specifically, the labour force participation rate of the females. I show that this variable is affected by the trade reform. A positive shock to female employment vis-a-vis men will lower dowry.

To empirically examine the impact of labour market changes on dowry payments, I first estimate the reduced form effect of trade on dowry. I leverage the marriage payments data from 1982 to 1999 from Rural Economic and Demographic Survey. As I consider only short to medium term effects of trade on marriage payments, it is equivalent to the trade reform occurring in the second period. This implies that parents will not be able to change the pre-marital investments of their children as they were determined in the first period. This is the main advantage of using trade reform. The households did not anticipate these reforms and therefore, the pre-marital investments of the marriageable age population remain fixed, at least, for a few years following the reform. This allows me to identify the impact of labour market returns on marriage payments without the confounding effect of changing educational investments. I find that dowry falls by 24 percent in districts that are more exposed to trade reforms relative to districts that are less exposed.

The observed decrease in dowry can be explained by the improved potential of women in the labour market. I investigate this by measuring the change in the district-level employment and earnings using data from Employment and Unemployment survey. I find that the proportion of women employed in wage work relative to men increases in the exposed districts and the wage gap between men and women decreases in the bottom half of the distribution. These changes in employment patterns can be traced to agricultural employment. While the probability of men engaged in ploughing decreases, the probability of women engaged in harvesting increases. However, the labour market outcomes do not change in favour of women in the exposed districts within states characterized by highly

male-biased sex ratio. This heterogeneity in labour market outcomes provides an important placebo test when female labour force participation is instrumented using trade exposure. Dowry should not decrease faster in exposed districts of these states if the true mechanism at work is the changing labour market conditions.

There could be two other possible explanations for the observed decrease in dowry. Hypothetically, dowry can decrease if the women match with lower quality men, say in terms of years of schooling. I examine if the matching patterns change in the exposed districts in the post-reform period. This also serves as a robustness check because the pre-marital investments should be fixed for the population of marriageable age. Therefore, I should not observe any change in the matching patterns across districts based on trade exposure. This is what I find in the data. Second, trade can affect income of the households and increase poverty in the exposed districts. This will lead to a pure income effect and decrease the dowry payments. I do not find evidence of decreasing household income in the more exposed districts. Further, I include the real household income as a control variable in all the dowry specifications.

The analysis suggests that the relationship between trade reforms and dowry is driven by the labour market changes. As I do not find evidence of other obvious channels, through which trade could affect dowry, I instrument female wage employment participation with trade exposure. If in fact, trade affects dowry through the labour market channel then, as mentioned above, dowry should only decrease in the exposed districts of the less-biased states. This is exactly what I find. Increasing female wage employment is able to explain 45 to 75 percent of the observed decrease in dowry.

This paper makes a number of contributions to the literature. By causally linking the economic potential of women to their value in the marriage market, this paper contributes to the empirical literature on determinants of dowry where prior empirical work is either based on non-representative samples or is agnostic about the earning potential of women. Second, many research papers focus on how the cultural institution of marriage payments affects individual outcomes. In this paper, I focus on the reverse relationship and show that the effect also flows from the current economic environment of an individual to traditional customs. Lastly, this paper contributes to the literature on trade and development as I examine the impact of liberalization reforms on gender wage-gap, employment patterns and incomes.

2 Related Literature

Literature has primarily identified two rationales for the existence of dowry: bequest motive and price motive (Arunachalam and Logan, 2016, Anderson and Bidner, 2015, Borker et al, 2017). The bequest motive implies that dowry transfer is a form of inheritance given to the bride at the time of her marriage (Botticini and Siow, 2003) while the price model,

first formalized by Becker(1991) looks at dowries as a transfer which do not benefit the bride directly. There exist several competing theories of why dowries have persisted in India that model one or both the rationales of dowry. Some explain the persistence of dowry due to a shortage of grooms in the marriage market (Rao, 1993) while some others point towards caste-competition and increasing heterogeneity in male earnings as the reason for dowry persistence (Anderson, 2003); some hypothesize that it increased in India because lower castes started paying dowry to emulate the higher castes (Srinivas, 1956) and some others rationalize it through the bequest motive given the weak legal and economic rights of women in India (Zhang and Chan, 1999, Botticini, 1999, Botticini and Siow, 2003, Brown, 2009).

In this paper, I look at an alternate mechanism, the earnings of women, that could affect these payments. In that sense, this paper is related to the predictions in Anderson and Bidner(2015) which hypothesizes that a sufficient increase in the the returns to human capital of women can result in a disappearance of dowry altogether. I use data from Rural Economic and Demographic Survey to causally estimate the impact of labour market mechanism on dowry. The advantage of using REDS is that it is a nationally representative household survey. Other theories of dowry that have been tested empirically have usually relied on small and non-representative samples (Rao 1993b, Dalmia and Lawrence 2005, Sautmann, 2011, Edlund, 2006, Caldwell and Caldwell, 1983, Caplan, 1984.). Chiplunkar and Weaver (2017) tests these other theories utilizing the data from REDS. However, they do not look at the causal impacts of labour market changes on dowry payments.

This paper also contributes to the literature on cultural practices and gender attitudes (Alesina, Giuliano and Nunn, 2013, Fortin, 2005, Fernandez, 2007, Fernandez and Fogli, 2009). Most empirical papers study the impact of marriage payments on economic outcomes of women such as education(Ashraf, 2016), age at marriage(Corno, Hildebrandt and Veona, 2016), savings behaviour of families (Anukriti, Prakash and Kwon, 2018) and preference for sons (Borker et al, 2017, Alfano, 2016, Bhalotra et al, 2018). In contrast, this paper looks at an economic policy reform that comes with modernization and finds evidence that small policy shocks can also affect traditional customs.

Finally, this paper makes a small contribution to the literature on trade and development. This vast literature looks at the impact of trade reforms on wage inequality, poverty, fertility, schooling, crime etc (Topalova, 2010, Edmonds, Pavnick and Topalova, 2010, Anukriti and Kumler, 2015, Attanasio, Goldberg and Pavnick, 2004, Juhn et al, 2014. A recent paper by Autor, Dorn and Hanson(2017) looks at the impact of increase in Chinese imports on the probability of marriage in the US. In this paper, I do not look at the probability of marriage in India but at the response of marriage payments and labour market opportunities of men and women to trade reforms in India.

3 Model

Consider a two-period model in which there are N male families and N female families, each with one off-spring, where the male families have a son and the female families have a daughter. Each family is endowed with wealth Y[3]. I assume that families have logarithmic preferences over consumption that are additively separable in the consumption of the parent and their child. The utility function of a family i is given by $U_i : log(C_i) + log(c_i), \forall i = \{m, f\}$

In the first period each family decides the optimal level of investment in their child denoted by $e_i = \{e_m, ef\}$. These investments determine their quality in the second period when they enter the marriage market. In the marriage market, the parent of the bride offers a dowry payment g to the groom and the groom accepts or rejects the offer. The groom accepts if the dowry offer is high enough to exceed his outside option, which is to remain single. The bride always participates in the marriage market as staying single results in extreme disutility for her family.

The quality of the off-spring is defined as the expected sum of their labour market returns and their contribution to the non-market activities such as production of household goods. This includes taking care of children, engaging in household chores etc. The quality of the bride is defined as $q_f = k_d W(e_f) + (1 - k_d)\mu.e_f$, where k_d is the female labour force participation rate in the district. The probability that the bride participates in the labour market is given by k_d. The wages she earns is a function of her education. I assume that $W(e_f)$ is increasing and concave in e_f. The value of the female in home production is linearly increasing in education, the linear parameter denoted by μ. The quality of the groom is $q_m = W(e_m)$. This implies that all the males participate in the labour market and not in household chores. Figure A.3 in the appendix shows the proportion of male and female labour force participation by age. It is clear from the graph that this is a reasonable assumption[4].

I solve this model backwards, beginning with the decision problem in the second period. The parent of the bride offers a dowry amount g to the groom. If the groom accepts the offer, the bride and the groom form a household and split the household resources between them. Assume that the groom consumes α and the bride consumes $(1 - \alpha)$ of the total household resources, where $\alpha \in (0, 1)$ and is exogenously determined[5]. The total household resources are equal to the sum of male and female qualities and the dowry amount: $q_m + g + q_f$. If

[3]This can be thought of as the sum of income in two periods where the income of the second period is discounted by the rate of interest r

[4]Household chores are primarily considered to be the responsibility of the females in India.

[5]The individual consumption from household resources can also be derived from a generalized Nash bargaining model. However, it does not affect the main predictions of the model. Therefore, I omit that step for a more parsimonious specification

the groom does not participate then he consumes his labour market earnings, $W(e_m)$. For the groom to participate in the marriage market:

$$\alpha[W(e_m) + g + k_d W(e_f) + (1 - k_d)\mu\ e_f] \geq W(e_m) \tag{1}$$

The participation constraint of the groom is used to determine the lower bound on the dowry function:

$$g \geq W(e_m)(\frac{1-\alpha}{\alpha}) - (k_d W(e_f) + (1 - k_d)\mu.e_f) \tag{2}$$

The brides have no option but to participate in the marriage market and I don't assume heterogeneity in the population. This implies that the dowry function given above is binding. Dowry is increasing in the wages and education of the men and decreasing in the wages and education of the women.

Thus, the consumption of the parents and the children can be written as follows:

$$\begin{array}{ll} \mathrm{C}_f = Y - g(e_m, ef) - e_f & \mathrm{C}_m = Y - e_m \\ \mathrm{c}_f = (1-\alpha)(q_m + g(e_m, ef) + q_f) & \mathrm{c}_m = \alpha(q_m + g(e_m, ef) + q_f) \end{array} \tag{3}$$

In the first period, the parents choose the optimal investments in their children, given the dowry function,g^*, in equation(2) . The parent of the bride maximizes:

$$max\ log(Y - g^* - e_f) + log(c_f^*)$$

The first order condition for the maximization problem gives the optimal investment in the daughter, e_f. Similarly, the parent of the groom chooses the optimal investment in the son by maximizing:

$$max\ log(Y - e_m) + log(c_m^*)$$

where the first order condition determines the optimal investment in the son. These optimal investments are given below.

For the bride:

$$k_d W'(e_f^*) + (1 - k_d)\mu = 1$$

For the groom:

$$\frac{W'(e_m^*)}{W(e_m^*)} = \frac{1}{Y - e_m^*}$$

3.1 Dowry and Trade shock

Suppose that trade liberalization occurs in the second period. The parents cannot change the investments in their children which were determined in the first period in the anticipation of these reforms. Therefore, the optimal investments, (e_m^*, e_f^*) are fixed. Trade reforms affect the dowry function by changing either the participation of women in the labour market k_d or by changing the wages of men and women.

From equation(2),

$$\frac{dg}{dt} = (\frac{1-\alpha}{\alpha})\frac{dW(e_m)}{dt} - k_d\frac{dW(e_f)}{dt} + \frac{dk_d}{dt}[W(e_f) - \mu\ e_f] \tag{4}$$

Trade affects the dowry payments through its effect on relative wages of the men and women and through the labour force participation of women in the district. If trade leads to higher female employment within a district (third term) then dowry decreases only when the wage earning function is higher than the contribution of the bride in the household. Second, dowry also decreases if the relative wages change in favour of females relative to males (first and second terms). The effect is ambiguous if one effect goes in the opposite direction to the other.

In the empirical section below, I show that the relative wages increase in favour of the females and female employment also increases. Hence, the model predicts that the dowry payments will decrease. The dowry payments also depend on the wages and education of the bride and the groom. Therefore, in the regressions, I include variables such as the groom's years of schooling, whether the groom's household has land, the size of the land as these variables determine the earning potential of groom in the labour market[6]. I control for the female quality by including her years of schooling. Further, I include the household size of the groom as a proxy for μ, which was defined as the bride's contribution to the household activities. The larger the household size of the groom, the larger the contribution of females in the household production. Other variables include the age at marriage, whether the marriage is inter-caste and the real household income.

4 Context and Data

4.1 Trade Liberalization 1991

India's trade policy was designed in the Second Five Year Plan (1956-61) and remained static till the late 1980s. The Indian trade regime was characterized by high tariff and non-tariff barriers (NTB), a complex import licensing system and restriction of certain imports

[6]In the rural economy, land is a significant determinant of the earning opportunities of the men

to public sector only (Topalova, 2010). The trade policy started changing from an import-substitution strategy to export-led growth strategy only towards the end of 1980s. However, this change was extremely slow and did not have a wide reaching impact[7].

Towards the end of 1990, India faced a massive macroeconomic crisis brought about by fiscal and current account imbalances and turned to International Monetary Fund(IMF) for assistance with its external payment crisis. A Stand-By Arrangement was negotiated with the IMF in August 1991 conditional on India undertaking massive structural and macroeconomic reforms. Trade liberalization was a part of this reform package. The trade policy reforms included a reduction in the overall level and dispersion of tariffs and removal of quantitative restrictions on imports. The average tariff fell from 80 percent in 1990 to 37 percent in 1996 and the standard deviation across tariffs also fell by 50 percent (Anukriti et al, 2015).

The Indian trade liberalization policy offers a good setting to analyze labour market changes and their impact on the relative position of men and women in the marriage market. These reforms were largely unanticipated and gave no time to the households to adjust their employment, investment or consumption decisions. Moreover, the conditions were imposed as a part of an IMF bail out package. There was no debate among the officials prior to its adoption. This addresses the concerns of the political economy variables affecting the policy design. Topalova(2007) finds that industry-level tariff changes are uncorrelated with several proxies of an industry's political influence prior to 1991, such as the number of employees, the proportion of skilled workers, and industrial concentration (Anukriti and Kumler, 2015). Previous studies also find no correlation between an industry's future tariffs and its productivity before 1991 or productivity growth during 1989-1997 (Topalova and Khandelwal, 2011). It is therefore, unlikely that any of the results in this paper are driven by adjustments in anticipation of these reforms.

4.2 Data

The analysis uses data from two different household surveys. The data for dowry is obtained from the 1999 round of Rural Economic and Demographic Survey (REDS). REDS is a nationally representative survey that collects detailed information on marriage payments, economic and other demographic characteristics of rural Indian households in 17 major states of India. The survey collected data in four rounds from 1969-2008 [8]. The advantage of the REDS 1999 is that it reports data on actual dowry paid or received by the family, unlike other surveys like the Indian Human Development Survey(IHDS) that report only

[7]Even as late as 1989-90 only 12 percent of manufactured goods could be imported under an open general license and average tariff was still greater than 90 percent(Topalova, 2010).

[8]These first survey wave was conducted from 1969-71, the second in 1982, the third in 1999 and the last from 2006-08

the expected value of dowry in one's community [9]. The REDS 1999 collected information on actual dowry paid by the sisters and the daughters of the household head and dowry received by the fathers, brothers and the sons of the household head and his spouse. I use this data set to construct a retrospective history of marriages across decades. In addition to the 1999 survey round, I use the household income data from the 1982 survey round as a measure of household income before the liberalization reforms[10].

To estimate labour market employment and earnings at the district level, I use the data from the 38th(1982-83), 43rd (1987-88) and the 55th(1999-00) round of the Employment and Unemployment Survey conducted by the National Sample Survey Organization(NSSO). These NSS rounds are repeated cross-sectional surveys, representative at the district level. They provide information on the household expenditure, wages, occupation (self-employed, casual labour etc.), industrial affiliation, caste and various other household and individual characteristics. I use only the rural sample of this survey because information on dowry is available in REDS only for the rural households.

The district-level tariff data comes directly from Topalova(2010).

4.2.1 Net Dowry

To construct the data on dowry payments, I utilize the REDS 1999 survey. It provides data on actual dowry paid or received by the family. Specifically, it asks the amount of gifts given or received by the family at the time of marriage, along with the year of marriage[11]. I exploit this data to construct a retrospective panel of marriages at the district-year level from 1940 to 1999. Net Dowry is estimated as the difference between "gross payment by the bride's family to the groom's family" and the "gross payments by the groom's family to the bride's family" if the survey question asks the household head about the marriages of his sisters and daughters. This can also be denoted as the net dowry paid by the household. If the question pertains to the marriage of the household head's brothers, sons or father,

[9] A widely cited survey that collected information on dowry was conducted by the International Crops Research Institute for Semi-arid Tropics (ICRISAT). These data only contain 127 observations on marriages between 1923 and 1978 from six villages in three districts of South India. Moreover, it does not collect data after 1991 and therefore, I cannot use this data to analyze the impact of trade liberalization reforms. Another survey that collects information on dowry is the Status of Women And Fertility (SWAF). However, it does not report the actual dowry amounts. It divides the amount of dowry paid into 5 ordinal values. Also, it was undertaken in 1993-94 and so cannot be used for the purpose of the question examined in this paper.

[10] A large proportion of households surveyed in the 1982 round were surveyed again in 1999 rounds. New households were added to account for attrition in such a way that they are representative of the households that were not surveyed again. Although, I make use of the repeated cross-section nature of the data at the district-level, the household income data from the 1982 round is derived only for the panel households to improve the estimation of household income in the pre-reform period. The dowry data from the new households surveyed in 1999 is used only for the post-reform years because the measure of income for these households is available only in the 1999 survey wave and not in the 1982(pre-reform) survey wave.

[11] The surveys were administered to household heads who provided information on marriages of other household members. Male heads were asked about their siblings and children while female heads were asked about their children, and the siblings and parents of their husband.

I estimate the net dowry received by the household as the difference between the "gross amount received by the groom's household" and the "gross amount paid to the bride's household". I deflate this nominal net dowry amount by the 2005 Consumer Price Index for Agricultural workers and I change the base year to 1999. Real net dowry at the district-year level consists of real net dowry paid and real net dowry received for a marriage in a given year within a district [12].

Figure 2 and Figure 3, show the evolution of dowry across decades. The proportion of households who paid or received dowry increased rapidly from 1940 till 1970 after which dowry prevalence was nearly universal across all marriages (Figure 3). Figure 2, shows a five-year moving average of real net dowry and the ratio of female to male working population on the right-hand axis. In real terms, the size of dowry increased till 1970 after which it started declining following a jump in female to male employment[13].

In addition to the data on dowry, REDS collects information on certain characteristics of the spouses like years of schooling and caste. It also collects information on the individual and household characteristics of the groom like the land holdings of the groom's household, his inherited land and his household size [14]. These variables capture the value of the grooms in the marriage market that could explain the observable variation in dowry payments. I use these as controls. I also include the years of schooling of the bride and the years of schooling of the groom as controls to account for the variation in dowry within the district due to the pre-marital investments of the groom and bride. Column(1) of Table A.1 in the appendix shows the correlation between the labour force participation of the wife on the dowry received by the head of the household. The dowry paid by women who participate in the labour market is lower than those who do not participate. The information on labour force participation status is not available for the all the women whose dowry I observe in the data. Therefore, I use this inverse relationship between dowry and labour market value of women to motivate the analysis and the empirical strategy used in this paper which is used to establish the causal relationship between labour markets and dowry payments.

4.2.2 Measuring Trade Exposure

The trade exposure measure is estimated using the change in average tariffs within a district before and after the reforms. To construct the measure of district exposure to trade reforms, I interact the nominal tariffs in an industry i over time t, $tariff_{it}$ with the employment share of each industry i within the district d in 1991. The employment share refers to the proportion of workers in each industry i within district d out of the total workers in district d. The data on the number of workers employed in each industry at the

[12] The dowry received by the household is the dowry paid by some other household in the district.

[13] See Chiplunkar and Weaver (2017) for detailed description of the marriage markets in India.

[14] The groom's household characteristics are available for the sisters and daughters of the head. If the marriage data relates to the household head's brothers or fathers or sons, these characteristics are available for these men.

district level is obtained from the 1991 Census of India. It provides data on employment across production sectors within a district at the three-digit level of National Industrial Clasisfication (NIC).

The district trade exposure is computed as follows:

$$Tariff_{dt} = \frac{\sum_i Worker_{d,i,1991} Tariff_{i,t}}{TotalWorkers_{d,1991}} \tag{5}$$

The tariff data is available annually since 1987[15]. For the purpose of this paper, I use the 1987 tariff rates as the measure of protection in the pre-liberalization period and the 1997 tariff rates as the measure of protection in the post-liberalization period. I focus on tariff change between 1987 and 1997 for two reasons. Topalova and Khandelwal(2011) shows that prior to 1997 tariff changes were free of political economy considerations. She finds that the future tariff changes were uncorrelated to the current productivity level of firms. This implies that there is no evidence that the policy makers were trying to protect the less efficient firms.[16] However, after 1997, Topalova and Khandelwal(2011) finds a negative correlation between future tariff changes and industry-level productivity. Second, India's trade liberalization policy was set in Second Five Year Plan (1956-61) and remained extremely static for three decades. It started changing only towards the end of 1980s. Therefore, I assign the tariff rates in 1987 to the pre-liberalization period. The post liberalization tariffs are captured by the tariff rates in the year 1997.

The change in the trade exposure measure from 1987 to 1997 identifies which districts experienced large reductions in trade protection relative to others. This variation in the loss of protection is the main identification strategy that is used to establish the causal effect of tariff reform on dowry and labour market in this paper. Furthermore, the employment shares are estimated using the 1991 Census data and the change in employment patterns across men and women post the trade reform is not endogenous to this measure of exposure. Therefore, this measure could be used to establish causality between trade reform and labour market shocks.

Although tariff cuts the entire economy, there were certain industries like cereals and oilseeds that were protected from the liberalization reforms[17]. Only the government could be an importer of goods in the "non-traded industries". The trade exposure measure constructed above assigns a zero tariff to the non-traded industries for the entire time period. As a consequence, districts with higher employment in these non-traded industries will mechanically have a lower T_{dt}. Moreover, a large proportion of the workers employed in cereals and oilseeds tend to be poor rural farmers. This implies that the tariff measure above will

[15]It is available at the six-digit level of the Indian Trade Classification Harmonized System(HS) for approximately 5,000 product lines.

[16]The tariff changes were spelled out in India's Eight Five Year Plan because of which they were free from any political economy considerations.

[17]Trade, transport and services were also a part of the non-traded industries.

be negatively correlated to poverty. Previous studies have addressed this problem by constructing a trade exposure measure using tariffs and employment in traded industries only (Hasan et al, 2007, Topalova, 2007, Topalova, 2010, Edmonds, Pavnick and Topalova, 2010, Anukriti and Kumler, 2015). I follow the literature and compute the traded tariff measure as follows:

$$TrTariff_{dt} = \frac{\sum_i Worker_{d,i,1991} Tariff_{i,t}}{TotalWorkers_{d,1991}} \tag{6}$$

The only difference between the two measures (5) and (6) is that the latter excludes employment in non-traded industries while constructing weights for industry-level tariffs (Anukriti and Kumler, 2015). Therefore, the traded tariff measure is not mechanically correlated to the initial poverty measure in the district. Figure 4 shows the change in the level of protection from 1987 to 1997, across the REDS districts, using the traded tariff measure of exposure. The traded tariff measure fell on average from 89 percent in the pre-reform period to 31 percent in the post-reform period.

4.3 Sample Restrictions

I restrict attention to 96 districts in 15 major states of India that are covered in the Rural Economic and Demographic Survey [18]. The Employment and Unemployment survey covers 355 rural districts from these 15 states. However, restricting attention to REDS districts does not create any disadvantage as REDS is nationally representative of an average district in India. Table 1 provides the summary statistics of the district characteristics from the Employment and Unemployment survey restricting to only REDS districts in Column(1) and to all the NSS districts in rural areas in Column(2). The REDS districts compare well to all the other districts in India in terms of industrial composition, caste composition and labour force participation rates. The only significant difference between these two samples is the total population of the district. The REDS districts have larger population on average compared to the rest of the districts. However, this does not impose serious concerns about the results. Therefore, the results of this paper are representative of an average Indian district.

Further, I consider only within district marriages. In India, most women migrate from their natal village to their husband's household when they get married. However, 77 percent of the women marry within their natal district of residence. This proportion has remained approximately the same since 1960 (Figure A.1)[19]. I also restrict the age at marriage of individuals. I use marriage data only for those individuals who were between 15 to 35 years

[18] I do not include the state of Assam in the analysis as it was surveyed in 1999 but not in 1982 and therefore, I cannot obtain a measure of the household income for the pre-reform period for this state.

[19] REDS contains information on the present district of residence. Figure A1 plots the probability that the sisters or the daughters of the head married outside the district. The data on district of residence prior to marriage is not available for the spouses of brothers or sons. Therefore, the underlying assumption is that the dowry is determined primarily by the district conditions of the groom.

when they got married. As can be seen from Figure A2 in the appendix, most of the women get married before they turn twenty and a large proportion of men get married before they turn twenty-five. Relatively few people get married after they turn 35. Therefore, I exclude these outlier marriages which might bias the results. For estimating the labour market impacts, I consider the employment and earnings of men and women who are between 15 to 30 years of age. I consider only the economic opportunities of the young population that enters the marriage market or affects the expectations of those individuals who are just about to enter the marriage market.

After matching with the tariff data, the REDS sample comprises of 8,564 marriages from 1982-99, in 85 districts and the NSS sample consists of 63,541 young men and women in the 15 to 30 age-group in the same districts[20].

5 Empirical Strategy

In order to identify the impact of labour market shocks on dowry norms in India, I use the Indian trade liberalization reforms of 1991. The Indian trade liberalization was unpredictable and externally imposed by the IMF, providing an unusual natural experiment. The nominal tariffs across production sectors declined suddenly following the reform. The exposure of a district to trade reforms was a function of the production sectors operating in the district prior to the liberalization of 1991. Therefore, based on the heterogeneity of the industrial composition some districts experienced larger reductions in tariffs compared to other districts. I exploit this variation in exposure to trade reforms to identify the causal effect of tariff reform on dowry and labour market.

5.1 Regression Framework

I employ a Difference-in-Difference identification strategy which depends on the district's level of exposure to trade reforms. Using district as the unit of analysis in this paper offers several advantages. The local labour markets are well defined at the district level. There is very low permanent migration of labour outside the district[21]. Moreover, as mentioned in section 4.3, the marriage market in India can be defined appropriately at the district level. To investigate the labour market impact on real net dowry payments, I first examine the reduced form effects of trade exposure on dowry. I then investigate the most probable

[20] There were several changes in district boundaries during the sample period. I match the REDS districts to the 43rd round of the NSS and then merge them with the tariff data provided by Topalova(2010) that uses the same district codes. This means that if a district was split into multiple districts after 1987-88, I combine them back into the original parent district to assign them the tariff variables. I exclude 4 districts from the REDS data from the state of Assam as it was surveyed only in 1999 and therefore, for the households in those districts, I do not have a measure of household income in the pre-liberalization period. 10 other districts are excluded as they had less than 30 observations on dowry across the sample period. I could not match one district from REDS to the NSS districts and therefore, exclude it from the analysis.

[21] Munshi and Rosenzweig(2016) report that rural-urban migration is between 5 to 6.5 percent in India, much lower than other developing countries with similar size and level of economic development.

mechanisms for the observed effect on dowry. I examine the labour market, the marriage market and pure income effects through poverty as the possible causes for the observed changes in dowry.

First, I begin by analyzing the average effect of trade exposure on dowry across districts. The regression framework relies on comparing real net dowry in districts that were more exposed to trade reforms with districts that were less exposed to trade reforms. The sample period includes data on 8,564 marriages from 1982-99. The marriages from 1982-91 constitute the pre-reform period and the marriages from 1992-99 constitute the post-reform period.

The following Reduced form specification is used:

$$Dowry_{idt} = \alpha + \beta.Tariff_{dt} + \phi Post_t + \theta X_{idt} + \delta_d + \gamma_t + \rho_d t + \epsilon_{idt} \tag{7}$$

Here, $Dowry_{idt}$ is the real net dowry paid or received by an individual i in district d during year of marriage t. The coefficient of interest is β which captures the average effect of trade exposure on dowry in the district. I include district fixed effects to account for any time-invariant heterogeneity at the district level while $Post_t$ is a dummy variable that takes the value 1 for marriages in the post-reform period. It captures the macroeconomic shocks that affect India as a whole in the post-liberalization era. X_{idt} includes individual level controls like a cubic in the age at marriage of the individual, years of schooling of the bride and the groom, the land holdings of groom's household, a dummy for whether the marriage is inter-caste, and the real household income of the bride or the groom[22]. The regression also includes year of marriage fixed effects, district specific linear time trends and religion and caste fixed effects[23]. The inclusion of year-fixed effects implies that the empirical strategy does not capture the aggregate effect of trade liberalization on dowry as the economy-wide impact would be captured by the year-fixed effects. In some specifications, I also include the district-level marriage market sex-ratio [24]. I cluster the standard errors at the district-year of marriage level.

The coefficient of interest, β, captures whether some districts benefited more than the others. It captures the differential outcomes across districts that were more or less exposed

[22]The household income of both the spouses is not available in the data. Therefore, I use the real household income of the head as the data captures the marriages of his or his spouse's relatives. This requires the assumption of positive assortative matching on wealth. The household income of one spouse must be highly positively correlated to the income of the other in the year of marriage. As is shown in the literature, positive assortative matching on wealth is usually true of marriages in India. See the appendix for details on the construction of this variable.

[23]Since *Post* already captures time fixed effects across the sample period, I drop the year 1982 while generating the dummies to compute the year of marriage fixed effects. The reference category for year of marriage fixed effects is 1999. Caste refers to the broad categorization of the population into SC, ST, OBCs and General category where the SCs and STs reflect lower caste. The NSS data does not capture OBCs as a separate category till 1999. Therefore they are categorized as a part of general category in this paper. The omitted category is the General Category. Hindu is the omitted category for religion fixed effects

[24]Sex-ratio is defined as the number of females per 1000 males. Marriage market sex-ratio includes females between 10-19 and men between 15-25. Details on its construction are in the appendix.

relative to the national trend. As the tariffs are falling over time, the change in the tariff exposure measure is negative. For ease of interpretation, I multiply the tariff exposure measure, $Tariff_{dt}$, with -1 so that the coefficient β could be interpreted in the usual manner. A negative sign on β implies that dowry is decreasing and a positive sign means that it is increasing.

The coefficient, β, is identified under the assumption that the unobserved time varying district specific shocks that affect dowry are uncorrelated with changes in district tariffs over time. As the exposure to tariff reforms is constructed by interacting the pre-reform industrial composition of the district with the national changes in industrial tariffs, any source of bias would have to be correlated with both the pre-reform industrial composition of the district and the national level tariff changes. This type of bias is less of a concern for traded sectors as other studies have found that there are no political economy concerns in case of tariff changes in traded sector. However, the tariffs do not change for the non-traded sector. If the initial size of the non-traded sector is correlated with the outcome variables then the OLS results will be biased. Following Edmonds et al. (2010), Topalova (2010), Anukriti et al (2015), I address this concern in three ways: I include district-specific time varying variables in the regression based on the pre-reform industrial composition of the district. I interact the post-reform indicator with the pre-reform district conditions such as the the share of workers employed in agriculture, mining, manufacturing, trade, transport, and services; the share of SC and ST population; and the share of literate population in a district [25]. Secondly, I instrument the district tariff with the traded tariff measure which is not influenced by the size of the non-traded sector in the district. Thus, the OLS and IV specification is as follows:

$$Dowry_{idt} = \alpha + \beta.Tariff_{dt} + \phi Post_t + \theta X_{idt} + \delta_d + \lambda I_{d,1987} * Post_t + \gamma_t + \rho_d t + \epsilon_{idt} \quad (8)$$

where $I_{d,1987} * Post_t$ captures the vector of pre-reform district characteristics interacted with the post-reform indicator and $Tariff_{dt}$ is instrumented with the traded exposure measure $TrTariff_{dt}$ that does not depend on the size of the non-traded sector in the district. The first stage relationship between tariff exposure measure and traded tariff exposure measure is given as follows:

$$Tariff_{dt} = \alpha + \beta.TrTariff_{dt} + \phi Post_t + \delta_d + \lambda I_{d,1987} * Post + \gamma_t + \epsilon_{idt} \quad (9)$$

Lastly, I conduct many robustness checks that account for simultaneous reforms and pre-trends trends in the outcome variables etc.

[25] I estimate the district shares using the Employment and Unemployment survey of 1987 and the appropriate weights so that the estimates are representative of the population.

5.1.1 Regression Framework- Labour Market

I analyze three possible mechanisms that could explain the dowry results- labour market, marriage market and poverty. To examine the labour market channel underlying the dowry results, I estimate the impact of tariff cuts on the labour market outcomes of young men and women, between 15-30 years of age. Figure A3 in the appendix shows the proportion of men and women in the labour force by age.

I use the employment data from the 43rd(1987) and the 55th(1999) round of the Employment and Unemployment survey of the NSS, to estimate employment statistics at the district level. I use only the "thick" rounds of NSS in these regressions. As the tariff exposure measure varies from 1987-1999, I can match only two rounds of NSS's Employment and Unemployment survey and cannot estimate yearly employment statistics. The regression specification is given as follows:

$$log(EmploymentRatio_{dt}) = \alpha + \beta.Tariff_{dt} + \phi Post_t + \delta_d + \lambda I_{d,1987} * Post_t + \gamma_t + \epsilon_{idt} \quad (10)$$

where $EmploymentRatio_{dt}$ refers to the relevant employment ratio in year t computed at the district level. The other variables included in the regression are the same as specification(7) except for the individual level controls, year-fixed effects and district-level time trends, as I measure changes in employment between 1999 and 1987. I focus on the wage employment of females in the district because most of the women who are self-employed work as unpaid labour in their households compared to the males (Figure A.4).

5.1.2 Regression Framework- Other mechanisms

I analyze the marriage market matching of females and males to see if the matching patterns are changing systematically with trade exposure. I utilize the data from REDS and the same specification as equation(8). I use the years of schooling of the husband, his land holdings, his caste as dependent variables to analyze the impact of trade reforms on the spousal characteristics of females and repeat these estimations to analyze if the males are matching differently. I also use the marriage market sex-ratio to analyze if that is changing differently in anticipation of the reforms. To analyze the poverty channel, I use the household income data from the 1982 and 1999 rounds of REDS and estimate specification(8).

6 Results

6.1 Main Findings

Table 2, presents the summary statistics of the variables used in the regression analysis. On average household paid Rs 35,000 or approximately $800 as dowry in the pre-reform

period. The real net dowry falls by approximately Rs.10,000 during the sample period. The average age at marriage of women is 19 and that of men is 22 before the trade reform and it does not change significantly for males or females in the post-reform period. The years of schooling increase for both men and women[26]. Finally, the change in tariff exposure measure for an average district is 5.5 percentage points between 1987 and 1997.

I first examine the impact of district-level tariff exposure on real net dowry paid or received. Table 3, Panel A, Column(1) shows the coefficient on district trade exposure and the post-reform indicator based on the OLS estimation of specification(7). I include district specific fixed effects and year of marriage fixed effects in all the models. Additionally, in Column(2), I include individual control variables; in Column(3) I also include the interaction between initial district conditions and the post reform indicator to control for the time varying district specific effects (specification(8)) and in Column(4) and (5), I include district-specific linear time trends as well. In all the specifications the standard errors are clustered at the district-year of marriage level.

All the specifications indicate that real net dowry declined faster in districts more exposed to trade reforms. The average decline in tariffs of 5.5 percentage points is associated with a reduction in real net dowry by Rs 8400 (Column(1)). Given that the average dowry paid in the pre-reform period was Rs35,000, this implies that in a district exposed to the average change in tariff exposure, the real net dowry falls by 24 percent in the post-reform period. I also estimate the regression using log of real net dowry as the dependent variable. The results are extremely consistent with the main finding. Dowry decreases by 22 percent in the districts more exposed to the trade reforms (Table A.10).

As discussed before, the estimates in Panel A will be biased if the trade exposure measure is correlated to the initial level of poverty in a district. The districts with a larger non-traded sector(oilseeds and cereals) tend to be poorer. If the initially richer districts experience faster decline in dowry for reasons other than trade liberalization like reversion to mean level of dowry then decline in tariffs will yield positively biased estimate of the causal effect of tariff reform. Therefore, I instrument the tariff exposure measure with the traded tariff measure in Panel C of Table 3. The traded tariff measure is not mechanically dependent on the size of the non-traded sector in the district and hence is not correlated with the initial poverty levels of the district. The coefficient on district tariffs in the IV estimation suggests that the decline in dowry is much larger than the impact predicted by the OLS estimation in Panel A. This suggests that the OLS estimates are downward biased and that the local

[26]Table A.1 in the appendix shows the correlation between dowry received by the head of the household and the wife's work force participation during the sample period. Dowry received by the head is approximately Rs 2000 lower or 9.5 percent lower if the wife participates in the labour market. The work force participation is a dummy variable that takes the value 1 if the wife participated in the labour market prior to the birth of her first child. This information is available only for a subset of the population and therefore cannot be used in the main specification at the district level due to fewer observations.

average treatment effects are much larger. The reduced form estimations using the traded tariff exposure and the first stage are shown in Panel B and Panel D respectively.

6.2 Robustness checks

In this section, I address three important concerns related to the identification strategy used to estimate the impact of trade exposure on dowry. First, an important concern with the Difference-in-Difference identification is the existence of pre-trends in the outcome variable. The results in the previous section would be biased if the measure of trade liberalization is systematically correlated to district specific time varying shocks that affect the evolution of dowry. To address this issue, I included district-specific time trends in Columns(4) and (5) of Table 3. In this section, I examine whether districts with different industrial composition had similar pre-reform time trends in dowry in Table A.2. Second, the tariff cuts occurred with many simultaneous reforms and I may be attributing the decrease in dowry wrongly to tariff exposure. Therefore, I examine if the results are confounded by other reforms that were simultaneous to trade liberalization in Table A.3. Third, I check if pre-marital investments of the marriageable age population are systematically correlated to the trade reform. The change in dowry could also result because of changing marriage market characteristics of the population, in which case, I may be wrongly attributing the decline in dowry to tariff reforms.

Table A.2, in the appendix, presents the falsification exercise. I assign pre-reform tariff measure to the marriages between 1978-84 and the post-reform tariff measure to marriages between 1985-91. The columns of Table A.2 correspond to the various model specifications in Table 3, respectively[27]. Panel A presents the falsification exercise for the OLS estimation of specification (8) and in Panel B, I instrument the tariff exposure measure with traded tariff measure which corresponds to Panel C in Table 3. If the tariff cuts are correlated to the pre-existing trends in dowry then the coefficients on tariff should be similar to the those in Table 3. The results confirm that there was no pre-existing trend in dowry that was correlated to the trade reform exposure measure across districts. The estimated value of β is not significant in any column.[28]

An important part of the trade liberalization process in India was the concurrence of tariff changes with many other structural reforms. In the post- liberalization period, India de-licensed its industries, eased the entry of Foreign Direct Investment, undertook major reforms in the banking sector and changed its strategy from import substitution to export

[27] Column(3) and Column (5) include initial district characteristics interacted with the Post reform dummy. Ideally, I would like to use the district characteristics from the 1983 NSS survey for the pre-trend regression. However, the 1983 NSS survey, records only regional identifiers. A region is made up of several districts. Since the REDS data surveys only few districts in the region, I cannot use the initial region conditions in the 1983 NSS surveys for the pre-trend regressions. Therefore, I use the district conditions provided in the 1987 NSS survey and assign them to the marriages between 1978-84 in Table A.2.

[28] Column(1) of Panel B in Table A.1 is mildly significant. The p-value of the estimated coefficient is .098 and it loses significance once I add the individual controls in other columns.

led growth . In Table A.3, I include these other reforms as controls in the regression. I find that the coefficient on the district tariff measure is similar to Table 3 estimates and statistically significant. Neither the magnitude nor the significance of the tariff coefficient is affected by the inclusion of these reforms.[29].

Finally, I check whether the pre-marital investments were changing differently across the districts which may have affected dowry payments within these districts. I analyse if the district tariff exposure is correlated to the years of schooling or the age at marriage of males and females across districts in a systematic manner (Table A.8).

7 Mechanisms

So far in this paper, I have established that districts where employment was concentrated more in sectors which lost protection witnessed a faster decline in real net dowry relative to the districts that were less exposed to tariff cuts. A natural question to ask is how do trade shocks affect dowry payments in the district or what are the underlying mechanisms for these observed effects on dowry? I analyze three potential mechanisms that could lead to a faster reduction in dowry in the more exposed districts vis-a-vis the less exposed districts. First, trade shocks can change the relative returns to women in the labour market thereby affecting dowry through an increase in their bargaining power in the marriage market. Second, the matching pattern in the exposed districts can change. If women in the exposed districts match with men with lower pre-marital investments then they would pay less than the women in the less exposed districts. Third, dowry could decrease through a pure income effect or an increase in poverty. In fact, Topalova(2010) shows in her paper that districts that were more exposed to trade liberalization witnessed a slower decline in poverty relative to the national baseline and this effect was most pronounced for households at the bottom of the income distribution. If relative poverty increased in more exposed districts then dowry may fall as a result of falling income level. In the following sections, I analyze these three channels. I do not find evidence in favour of the poverty channel or the marriage market channel. The change in dowry is explained by the improving position of females in the labour market which also increases their bargaining power in the marriage market manifesting itself as a decrease in dowry.

7.1 Labour Market

An increase in the employment of female labour or a decrease in the male-female wage gap will increase the bargaining power of women in the marriage market. Prior literature has shown that males and females are affected differently by trade shocks. Munshi and Rosenzweig(2006) find that globalization in India benefited girls disproportionately compared to boys by increasing their likelihood of attending English-medium schools. Autor, Dorn and Hanson(2017) find that the increase in Chinese imports in the US, reduce the

[29]The data on these reform variables is taken from Topalova(2010).

employment and earnings of young males relative to females and thereby decrease their probability of marriage. In this section, I analyse if female employment improves in the post-liberalization period in India and whether this explains the faster decline in dowry in the more exposed districts.

To do this, I use data from the Employment and Unemployment Survey of the National Sample Survey. I use the 1987 survey round to measure employment in the pre-reform period and the 1999 survey round to measure employment in the post-reform period. I divide the labour force participation into wage employment and self employment. The changes in female wage employment are more informative about changes in their bargaining power. Most of the females who report being self- employed are employed as unpaid labour in household enterprises. Approximately 77 percent of the females were engaged in unpaid self-employment in the household enterprises in the 1999 survey round (see appendix Figure A.4). While increasing unpaid self-employment can also reflect the rising costs of hiring female labour, a change in female wage employment effectively increases her contribution in household income and hence her bargaining power.

Table 4, shows the changes in the female employment relative to male employment for males and females in the 15-30 years age-group. I use different definitions of employment to capture the relative change in female and male employment. Column(1) captures the difference in the wage employment participation of females relative to males; Column(2) shows the difference in self employment participation of females relative to males; Column(3) shows the log odd ratio of days in wage employment of females relative to males; Column(4) shows the proportion of females in the population that are wage-employed in the district; Column(5) shows the share of males who participate in the labour force as a fraction of the total male population in the district and Column(6) shows the proportion of males who are self-employed as a fraction of the male population.

Trade exposure is associated with an increase in female wage employment relative to male wage employment both in terms of the number of females engaged in wage labour (Column(1)) and in terms of the number of days worked in wage employment (Column(3)). The proportion of females engaged in wage employment as a fraction of the female population also increases in districts that are more exposed to trade reforms(Column(4)). This increase in wage employment participation does not come about because of shortage of male wage labour or because of an increase in male self employment (Column(6)). As is clear from Column(2) and (6), male self-employment does not change systematically with tariff declines across districts. Even the labour force participation of males does not change across the districts based on their trade exposure (Column(5)).

Most of the people in rural areas are engaged in agriculture. The share of people engaged in farming was approximately 81 percent in 1987. Therefore, I analyze the operations conducted by casual labourers in the agricultural sector to identify the source of change

in these observed employment patterns. I look at the agricultural operations carried out by males and females within a district[30]. Figure 5 and Figure 6 show the proportion of wage-employed men and women engaged in various operations such as ploughing, weeding, transplanting etc[31]. It is evident from Figure 5 and Figure 6 that men and women are imperfect substitutes in the labour market. While men are engaged heavily in ploughing, women are mostly engaged in weeding and transplanting and both are engaged in harvesting operations. In Table 5, I examine the probability that men are engaged in ploughing, harvesting, other cultivation activities, other agricultural activities and manual labour. Similarly, in Table 6, I examine the operations that are more likely to be carried out by women. As I am analyzing the agricultural operations, I use the traded tariff measure only for the agricultural sector[32]. The probability that males are engaged in ploughing operations decreases by 5 percent in the district exposed to the average change in tariffs. On the other hand, the probability that males and females are engaged in harvesting increases for both in the exposed districts. However, the percentage increase is larger for women compared to men(19 v/s 10) and they do not suffer a decrease in employment from other operations they usually undertake while males have a lower probability of being employed in ploughing operations.

Next, I analyze the wage gap between males and females at different percentiles in their wage distributions. To do so, I use the 38th round(1983) of Employment and Unemployment survey as wage data are inaccurately reported in the 1987 survey round. Thus, these regressions are defined at the regional level (see footnote 31). I compute the wages earned by males and females per week at the 25th, 50th and 75th percentiles in their respective wage distributions and estimate the wage-gap using log of the female wage to male wage ratio at these different percentiles. Table 7, Panel A shows that the female wage relative to male wage is increasing in the bottom most quartile of the distribution. The wage-gap between males and females decreases even for the population below the median if I instrument the tariff exposure with traded tariffs in the agricultural sector (Column(2), Panel B).

Table 4-7 show that female employment relative to male employment is increasing, female wage employment as a fraction of the total female population between 15-30 years is increasing and the wage-gap between males and females is decreasing. The increase in employment of young females and the decrease in male-female wage gap, increases female's economic contribution in the household. Table A.4 shows the average wage contribution per week by females. The regression includes household level controls such as the household size, dummies for head's level of education, whether the head is a female and caste and religion dummies. The average wage contributions by young females increase in the house-

[30]I use the 1983 Employment and Unemployment Survey as the data on agricultural operations and wages is not reported accurately in the 1987 survey. The 1983 survey identifies regions which are composed of a few districts. Hence, I include region fixed effects and cluster at the region-year level.

[31]The survey asks the men and women about their current day operations. I only include men and women in wage employment.

[32]This excludes the manufacturing and mining sector which employ 7 percent of the population.

hold for districts that are more exposed to tariff declines. The average wage contribution increases by Rs 35 (Column(1)) to Rs 65 (Column(3)), per week, for a district that was exposed to the average decline in tariffs.

7.1.1 Heterogeneous Effects by Son Preference

In this section, I investigate if the impact of trade reforms on labour market was consistent across all the exposed districts. Trade liberalization created economic opportunities for women. However, whether they can take advantage of these opportunities depends on many other factors. In this section, I divide the states by their adult population sex-ratio into two categories- the states with sex-ratio above the average sex-ratio in India in 1991 are the less-biased states and states with sex-ratio lower than the average sex-ratio are the more biased states[33]. The average sex-ratio in India was 927 girls per 1000 men in 1991. Figure 8, shows the states that are more and less-biased towards males in India. The North-West belt of the country is comprised of states that have a low sex ratio (more males versus females) and lower labour force participation by women.

I use the adult population sex ratio as it captures years of discrimination against girls in a state. The sex determination technology arrived in India in two phases: it was introduced in the late 1980s and it spread substantially after 1994 following trade liberalization(Anukriti and Bhalotra, 2016).[34] As the technology was not widespread in 1991, using child sex ratio in 1991 would bias the results towards states where this technology spread first. I also cannot use the child sex ratio in 2001 as that might be a consequence of the reform. Therefore, I use the adult sex ratio at the time of the trade shock to classify states into more or less biased categories.

Panel B of Table 8 clearly shows, that the district level wage employment did not change for women in the districts that were more exposed to trade reforms if those districts belonged to the states with higher male-biased sex ratio. The change in the employment patterns of women came mainly from the districts of less-biased states. There can be several reasons for this. The cost of mobility of women in the states might be different. States which are traditionally more male-biased might impose a higher cost on mobility of women if they participate in the labour market due to safety concerns. Another reason could be that the value of females in home production may be higher in the more-biased states. These explanations correspond to a higher value of μ in the model. Finally, the substitution between male and female labour can be different across these states.

If the impact of trade reforms on dowry is truly explained by the labour market mechanism then I should not find a decrease in dowry for the exposed districts of the more-biased states.

[33]Sex-ratio is the number of women per 1000 men. I collect the adult sex-ratio data from the Population Census of India 1991.

[34]The child sex ratio dipped suddenly in 1991 and has been decreasing since, with a marginal increase in 2011.

This is exactly what I find in Table 9 which uses the same specification as Table 3 for these two categories of states. Panel B, shows that dowry did not decline faster for the districts that lost protection relative to other districts if these belonged to the traditionally male-biased states. The change comes from the districts of the less-biased states. This serves as a useful placebo test for the labour market explanation of the decrease in dowry.

7.1.2 Labour Market and Dowry- IV Strategy

The results of the previous section suggest that trade reforms affected the labour market employment patterns of men and women. In this section, I make the strong assumption that trade reforms affect dowry only through the labour market channel. I use the traded tariff exposure of a district as an instrument for the female labour market employment in the district. I show in the subsequent sections that other mechanisms that can violate the exclusion restriction, like the marriage market or the poverty channel, do not seem to be the operative forces behind the decrease in dowry payments. As the effects on labour market is heterogeneous by sex-ratio, I estimate the labour participation rates separately for the more-biased and less-biased states.

Table 10, shows the results for the IV strategy using specification(8). In Column(1), I instrument the Female labour force participation in the less-biased states; Column(2) uses the district level female wage employment and Column(3) uses the female casual wage employment as the main explanatory variables. As is evident, what matters for the decrease in dowry is not the female labour force participation but the wage employment of females. Columns(4) and (5) show the estimation results for the more-biased states. Dowry does not decrease faster in the districts of these states as labour market employment patterns do not change in response to trade reforms. This result increases the robustness of the labour market channel as a potential alternative to legislative bans on dowry.

7.2 Marriage Market

There are two ways in which marriage markets could explain the observed decrease in dowry. First, women match with lower quality men and second, the marriage market sex-ratio in the exposed districts decreases over time, so that the number of females per 1000 males in the marriage market is falling. In this section, I test for these effects of the marriage market on dowry.

Marriage market matching is an important determinant of the price of marriage or dowry. If the women match with men with lower pre-marital investments or lower wealth in the exposed districts then they will pay less dowry. As shown in the model above, dowry is an increasing function of both the wage earnings and education of men. In Table 11, I analyze the marriage market matches of females using the REDS data. I estimate specification(8) using as dependent variables the years of schooling of the spouse (Column(1)); a dummy for whether the groom's household owns land (Column(2)); the size of the land

holdings(Column(3)); the distance to the natal home (Column(4)) and whether the groom belongs to another sub-caste (Column(5))[35]. The marriage market matches do not change for women in the more exposed districts. Table A.5, presents the marriage market matches for men. None of the estimated coefficient on tariff is significant[36]. The decline in dowry cannot be explained by the matching patterns of males and females in the district. This also serves as a robustness check for the policy shock used in this paper. The pre-marital investments are fixed for the population of marriageable age. Therefore, on average, at the district level, the matching patterns should not change based on trade exposure.

Next, I examine if the marriage market sex ratio is changing across districts. In India, women usually marry older men. The average age at marriage of women is 19 years and for men it is 22 years (Table 2). A large proportion of women in the age cohort of 15-20 get married and a large proportion of men get married between 20-25 years (Figure A2). I use the population data from the 1991 Census of India to compute the marriage market sex-ratio for the post-reform period. It is defined as the number of women who were in the age cohort of 10-19 years as a fraction of the number of men in the age cohort of 15-25 years in 1991[37]. Figure 7 shows how the marriage market sex ratio has shifted in the post-reform period. The number of females in the marriage market as a fraction of the number of males is lower in the post-reform period. If this decrease in females varies systematically across the districts that are more or less exposed to trade then I will be wrongly attributing the decrease in dowry to trade shocks. Table 12 shows that the marriage market sex ratio does not change differently in the more exposed districts. I also include the marriage market sex ratio in the main dowry specification (Table 3) and find that it is not a significant variable in explaining the decrease in dowry. The coefficient on trade exposure does not change in size or significance even after I add the marriage market sex ratio as a control variable. Thus, I find no evidence of changes in marriage market conditions that are able to explain the faster decrease in dowry.

7.3 Poverty

Trade liberalization can lead to an increase in poverty in the more exposed districts (Edmonds et al, 2010). If tariff cuts are associated with an increase in poverty in the exposed districts vis-a-vis less exposed districts, then dowry could fall due to a pure income effect[38]. Lower household income may also delay the marriage of women in a patrilocal

[35]So far in this paper caste refers to broader division of the population into SC, ST and General categories. Sub-caste or jati is a finer division than the definition of caste used in this paper.

[36]The land holding of the bride's parents is not given in the REDS economic survey. I use the REDS demographic survey to estimate land owned by bride's parents and its size in Columns(2) and (3). The regressions include only those districts where the number of observations were at least 10 in each period. Therefore, the number of observations are different in these Columns.

[37]Similarly, for the pre-reform period, the marriage market sex ratio in 1981 is computed by dividing the number of women in the age-cohort 20-29 with the number men in the 25-34 age cohort as I use the data from the 1991 Census.

[38]Topalova(2010) finds that the headcount rate increased by 10 percent in districts that were more exposed to the Indian trade reforms.

society. Corno, Hilderbrandt and Veona(2017) find that droughts in India affect the timing of marriage of women[39].

To analyze if poverty is the channel behind the observed decrease in dowry, I analyze these two different explanations. First, I examine if the household income changes in the post-reform period in districts that are more exposed to tariff cuts. Table 12 shows the results for changes in real household income using specification(8). The household income data is derived from the 1982 and 1999 survey waves of REDS. I also use the data from Topalova(2010) on headcount ratios and poverty gap and do not find an increase in poverty for the exposed districts in my sample (Table A.6).

Next, I check if the probability of marriage decreases for women in districts that are more exposed to trade liberalization. As mentioned above, an increase in poverty can delay the timing of marriage for females because dowry could be used for consumption smoothing. In Table A.7, the proportion of never married population is the dependent variable. I divide the population of interest into three age categories: 15 to 20, 20 to 25 and 25 to 30. I then examine if the proportion of never married population has increased over time in districts that are more exposed to trade reforms in response to the increasing poverty. I find, on the contrary, that the proportion of never married population has been decreasing in the districts that are more exposed relative to the national baseline. The proportion is decreasing for both the male and female population. This result is not in line with the prediction that increase in poverty decreases the probability of marriage in dowry paying societies. Either the parents are inflexible about the marriage of their children after a certain cut-off age or poverty is not the driving force behind the observed dowry decrease.

Overall, I find no evidence that household income decreases or headcount ratio increases in districts more exposed to trade reforms. I also do not find any second order effects of increase in poverty on probability of marriage of men and women.

8 Conclusion

In this paper, I use the trade liberalization reforms of 1991 to examine if a change in the economic value of women can affect the traditional institution of dowry in India. Variation in the baseline industrial composition across districts and the intensity of tariff reforms across production sectors allow for a difference-in-difference identification strategy. I find that dowry decreases faster in districts that are more exposed to trade reforms relative to the districts that were less exposed to trade reforms. I conduct a series of robustness checks to ascertain the internal validity of this result. The decrease in dowry as a result of decline in tariffs is robust to the inclusion of other reforms that were concurrent to tariff changes

[39]They find that droughts decrease the hazard into child marriage by 4 percent annually during droughts because dowry payments flow from the bride's family to groom's family in India and they can be used for consumption smoothing.

such as the opening of Foreign Direct Investment, reduction in licensing and removal of quota restrictions. I also do not find any evidence of existence of pre-trends in the data.

I develop a two-period model to explain the changes in dowry payments through the labour market impact of trade reforms. As the pre-marital investments are determined in the first period, I can identify the impact of labour market on dowry payments without the confounding effect of changing education or other pre-marital investments of the bride and groom. The increase in female employment results in a decrease in dowry if the wage earnings of women is higher than their contribution in the household. Next, I examine empirically if the impact of trade reforms on marriage payments is explained by the position of women in the labour market.

Higher exposure to trade reforms leads to a decrease in dowry payments and this is explained by an improvement in the labour market position of young women relative to men. The proportion of women engaged in wage employment increases in districts that witness a greater loss of protection. The increase in wage employment and the decrease in male-female wage gap is an important determinant of the bargaining power of women in the marriage market. I focus on the wage employment of women as most women who report being self-employed work as unpaid workers in household enterprises. Therefore, an increase in the share of women who are engaged in wage work reflects that the earning opportunities for women outside their home have improved.

I explore other mechanisms that could be affected by trade reforms and could also have an impact on dowry. For example, if trade reforms increase poverty in the more exposed districts then the dowry payments will decrease due to a pure income effect. I do not find any evidence that the trade reforms increased poverty in the exposed districts in my sample. I also analyze the marriage market matching patterns and find no significant change in the matches before and after the reforms. Furthermore, I check if the marriage market sex ratio in the exposed districts can explain this observed decrease which is being spuriously picked up by trade reforms.

After eliminating most other channels that could affect dowry payments in a systematic manner, I instrument the district level female wage employment with the trade exposure measure and find that it explains 45 to 75 percent of the decrease in dowry payments. Finally, I check for heterogeneous effects on dowry according to the sex-ratio of the population in 1991. I find that female employment and earnings do not increase in the exposed districts of the states with high male-biased sex ratio. In the exposed districts of these states, female wage employment does not lead to a decrease in dowry in the post-reform period compared to the less exposed districts. This serves as a placebo test for the labour market channel and provides even more validity to this mechanism as a potential policy tool that could be used to reduce and ultimately eliminate the practice of dowry in India.

Thus, skill investment in females through vocational training programs or programs that provide part-time employment to women can go a long way in curbing the ill-effects of dowry. Given that legislative bans against dowry have been ineffective at combating this practice that propagates traditional patriarchal gender norms even today, this paper shows that the alternate labour market channel that directly augments the female share of income in the household can prove much more effective. However, care should be taken in designing these policies. Skill investment in females might not lead to increase in female employment, automatically, in certain states where the preference for sons is high. Therefore, the intensity of these policies will have to differ in accordance with the area of implementation.

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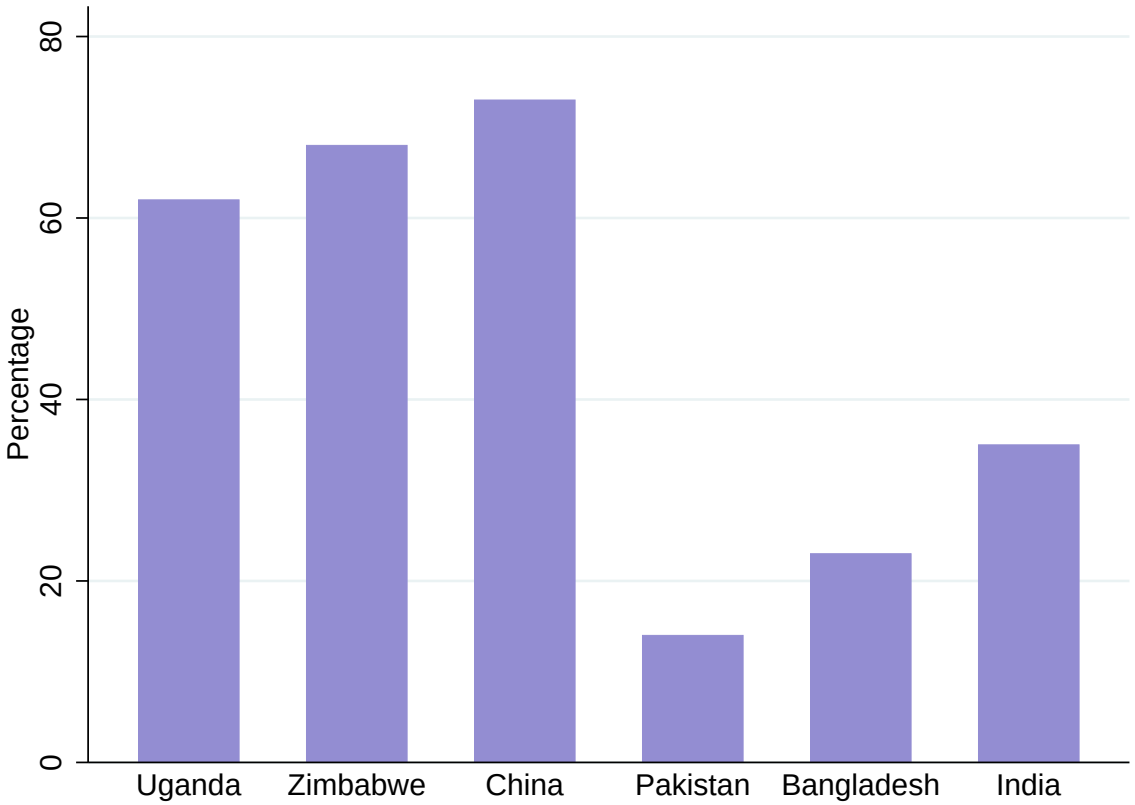


Figure 1: Country-wise Female Labour Force Participation

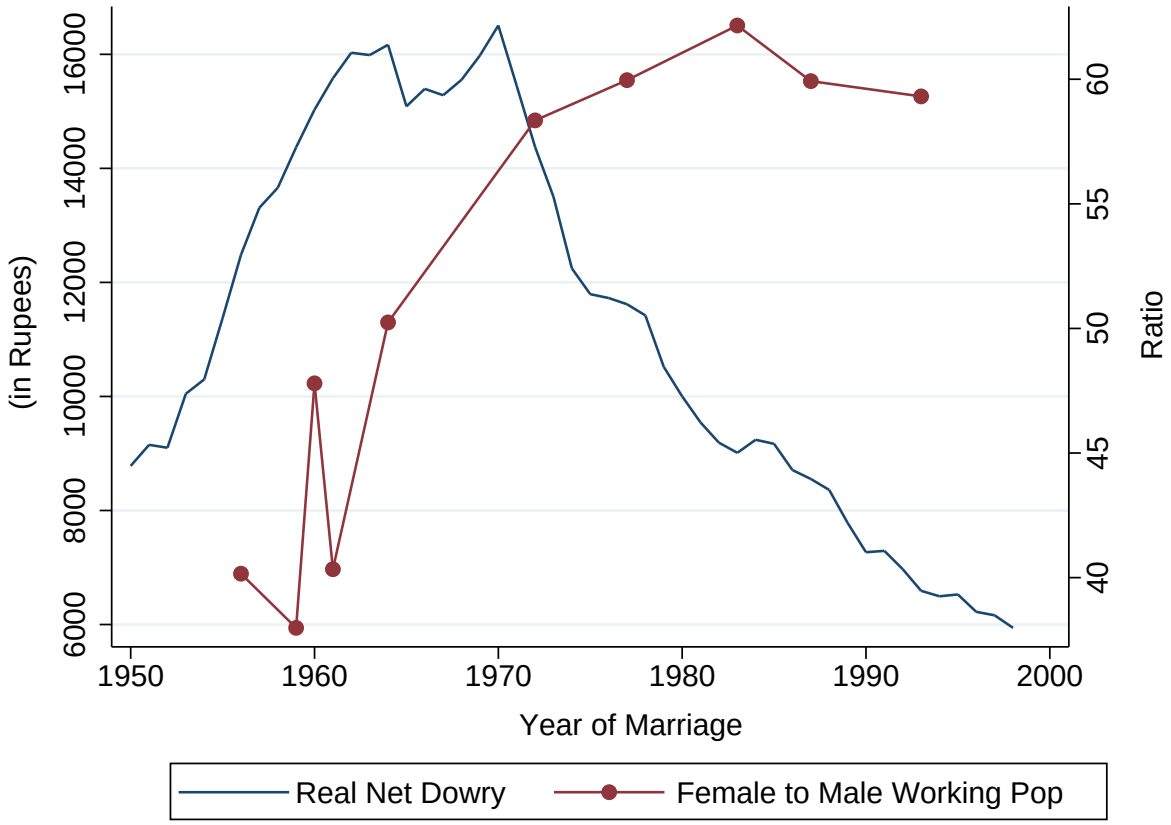
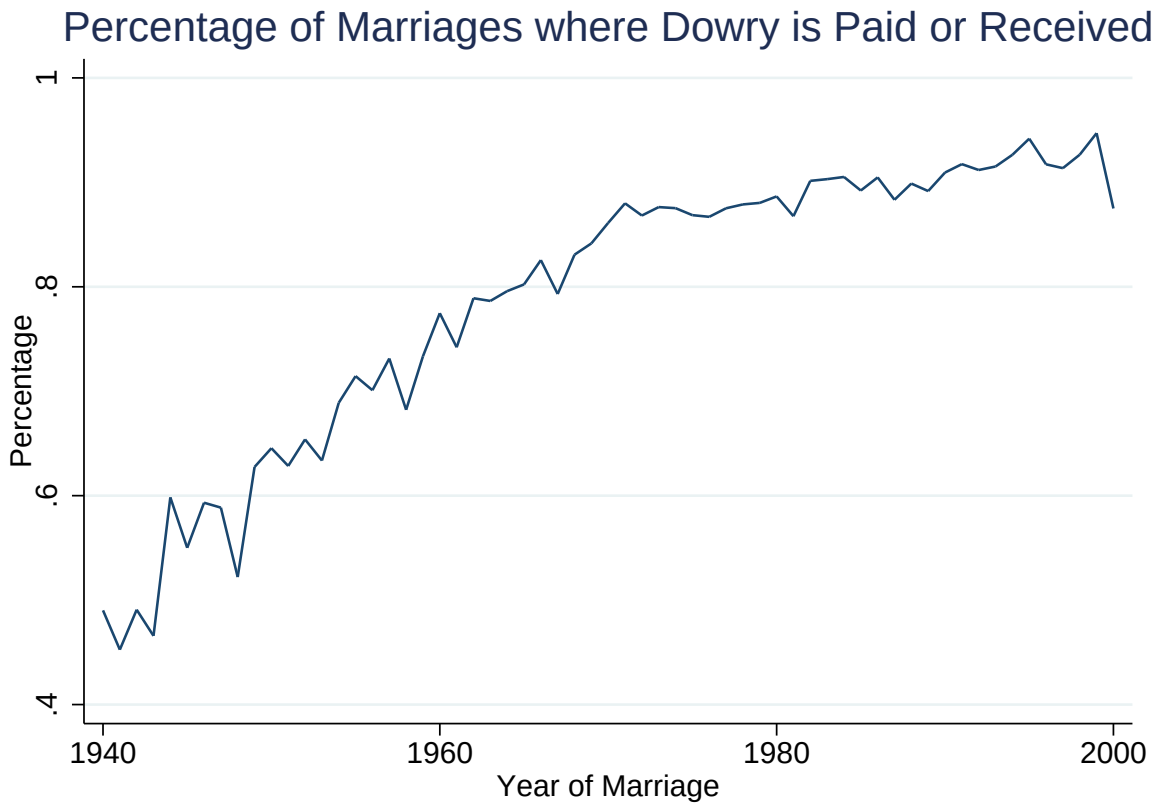


Figure 2: Evolution of Real Net Dowry (moving average) and Ratio of Female to Male working Population



Notes: The graph plots 5-year moving average of dowry against the working population ratio of women to men in rural India

Figure 3: Percentage of households that engage in dowry practice

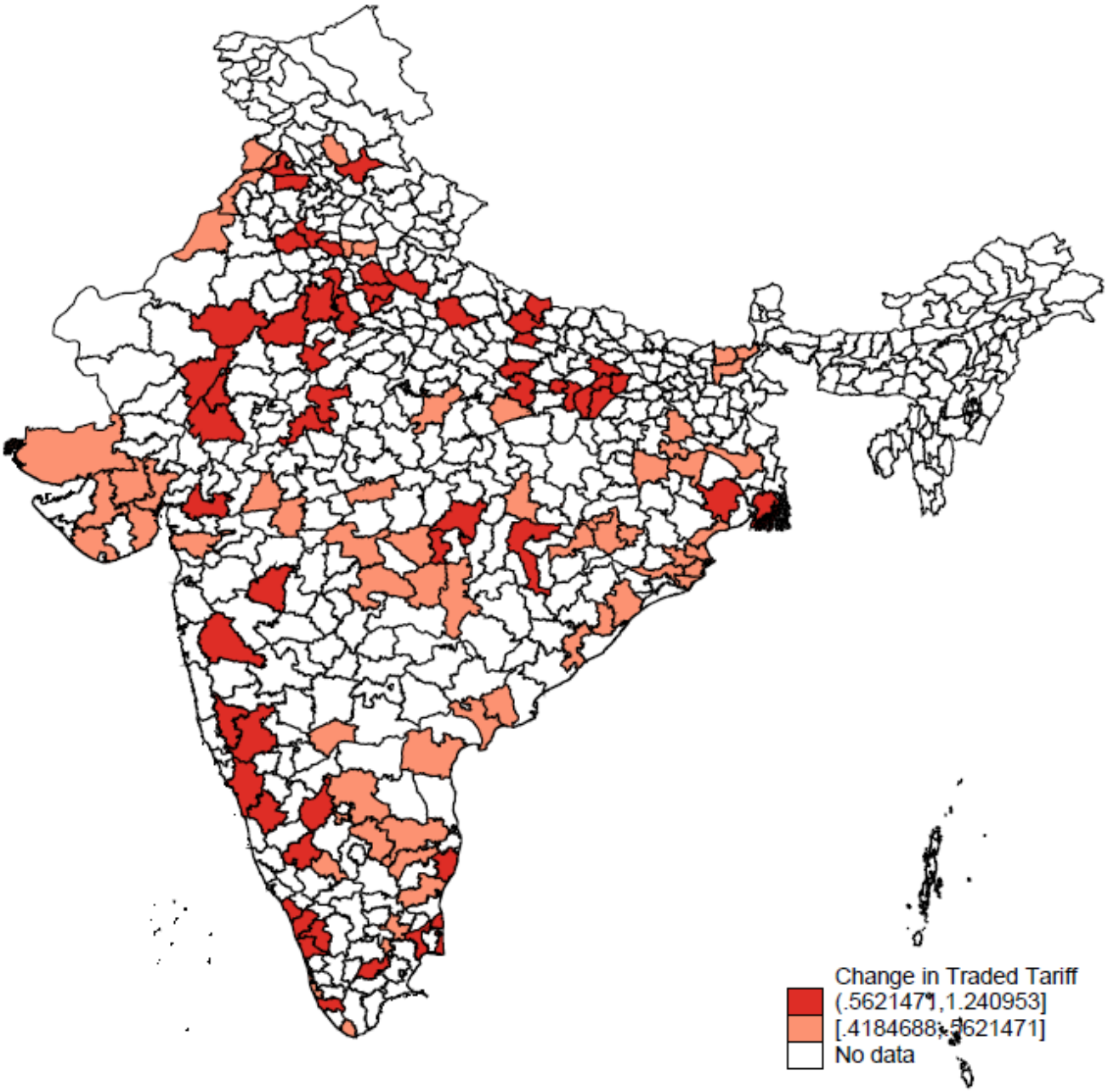


Figure 4: Variation in Traded Tariffs across REDS districts

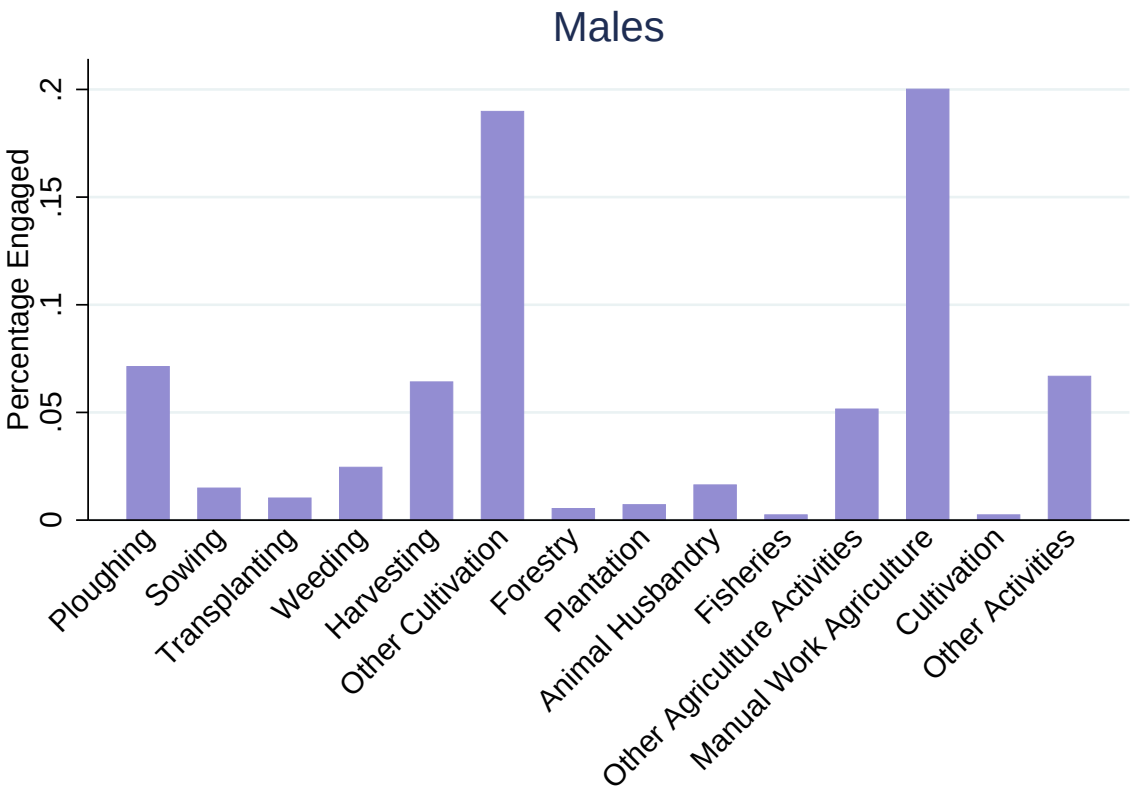


Figure 5: Proportion of Wage Employed Males in Agricultural operations

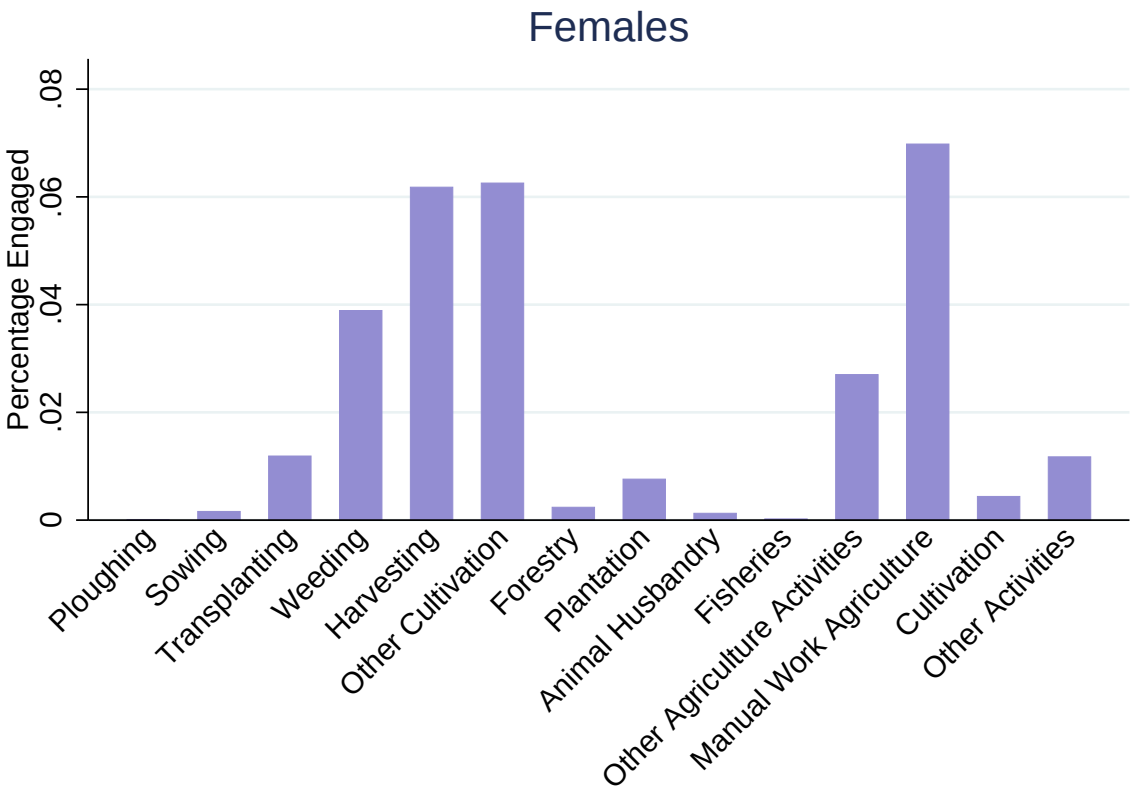


Figure 6: Proportion of Wage Employed Females in Agricultural operations

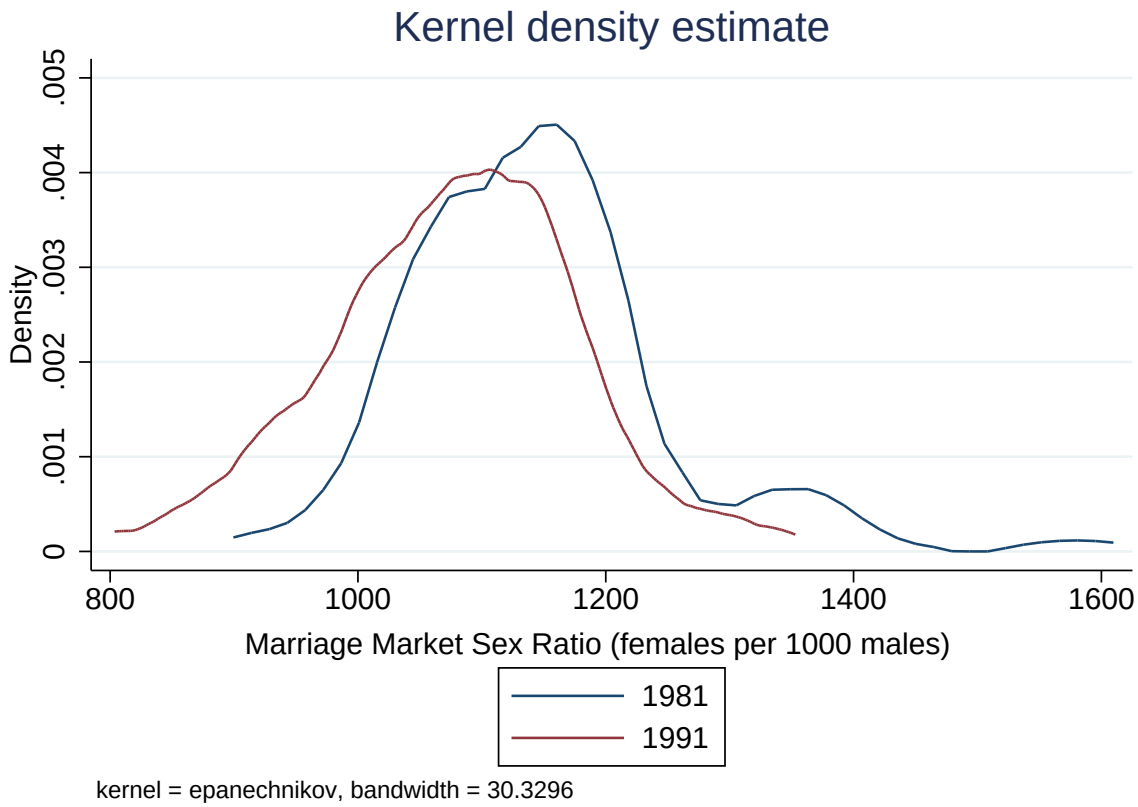


Figure 7: Marriage Market Sex Ratio

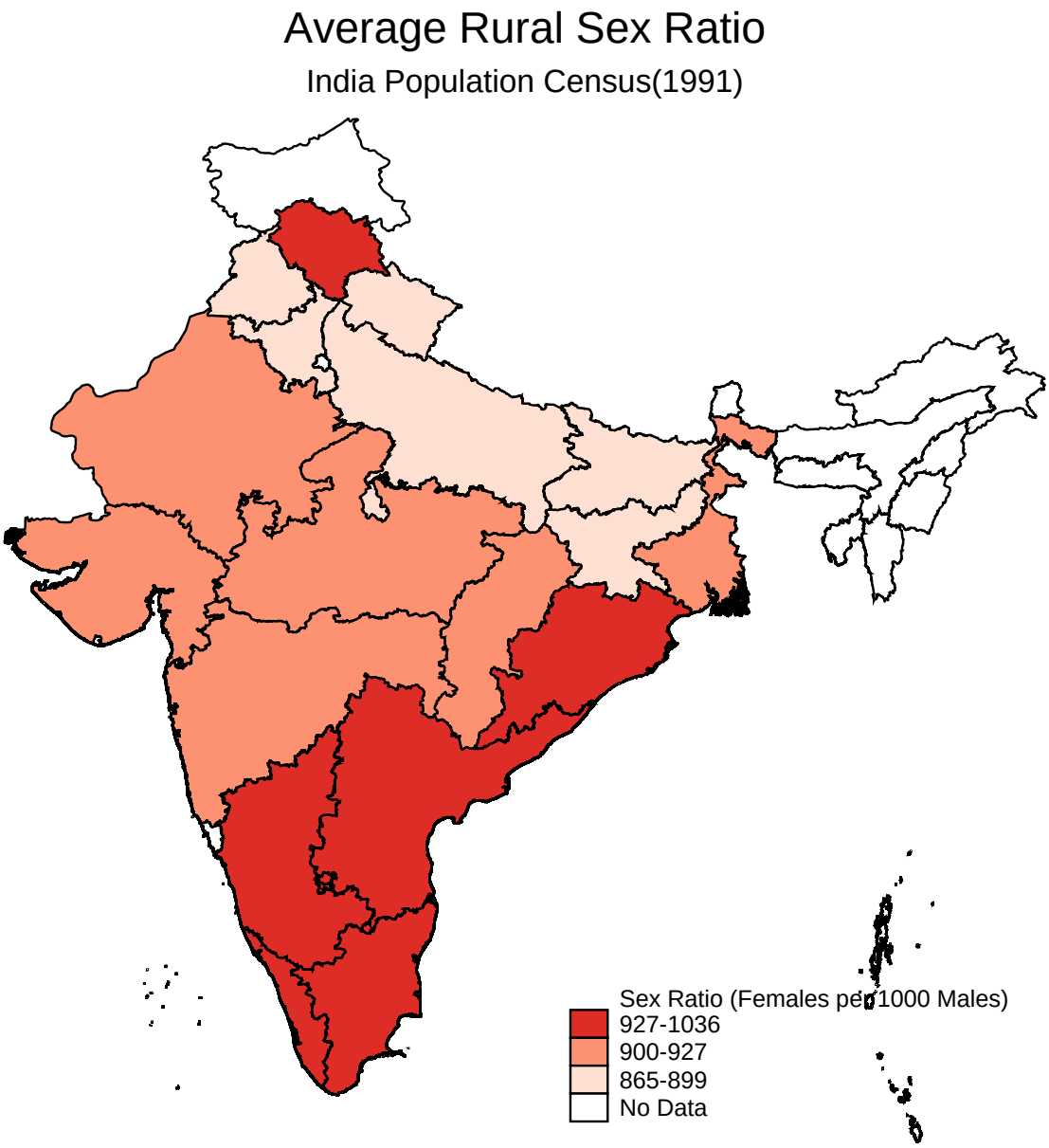


Figure 8: Sex Ratio in India, 1991

Table 1: Table of Summary Statistics

		NSS, Round 43, 1987		NSS, Round55, 1999	
		REDS districts	All Districts	REDS Districts	All Districts
		(1)	(2)	(3)	(4)
Total Population		25.36	21.26	30.30	25.42
Percentage Population years (Male)	15-30	0.29	0.29	0.30	0.30
Percentage Population years (Female)	15-30	0.30	0.30	0.30	0.30
Share SC/ST		0.27	0.28	0.28	0.28
LFPR (Male)		0.88	0.88	0.88	0.88
LFPR (Female)		0.38	0.40	0.38	0.39
Agriculture Sector		0.77	0.78	0.72	0.74
Manufacturing sector		0.07	0.07	0.07	0.07
Mining Sector		0.01	0.01	0.01	0.01
Electricity, Gas and Water		0.00	0.00	0.00	0.00
Construction Sector		0.03	0.03	0.04	0.04
Service Sector		0.12	0.11	0.15	0.14
Self-Employed(Male)		0.51	0.52	0.42	0.44
Self-Employed (Female)		0.21	0.23	0.16	0.18
Wage worker (Male)		0.34	0.33	0.44	0.43
Wage worker (Female)		0.15	0.15	0.21	0.21
Number of Districts		95	349	95	349
Observations		124552	365564	113178	333763

Table 2: Table of Summary Statistics - REDS

	(1)	(2)
	Pre-reform 1982-91	Post-reform 1992-99
Real Net Dowry(in '000 Rupees)	35.32	25.26
Age at Marriage(Female)	19.25	19.82
Age at Marriage(Male)	21.66	22.92
Years of Schooling(Male)	6.28	7.50
Years of Schooling(Female)	3.65	5.02
Current Land Holdings	212.27	182.06
Spouse owns Land	0.46	0.40
Distance	21.83	20.07
Inter-Caste	0.07	0.08
Tariff	0.08	0.03
Traded Tariff	0.89	0.31
Observations	5916	3849

Table 3: Reduced Form Effect of Trade Liberalization on Dowry

	(1)	(2)	(3)	(4)	(5)
			Panel A: OLS		
Tariff*Post	-152.383***	-156.149***	-147.780**	-149.064***	-120.908**
	(48.637)	(48.742)	(57.429)	(48.788)	(60.774)
Post	-7.599**	-7.385**			
	(3.510)	(3.614)			
			Panel B: Reduced Form		
Traded Tariff*Post	-31.727**	-25.171*	-27.527**	-26.581**	-33.940***
	(12.568)	(13.381)	(12.387)	(13.492)	(12.252)
Post	2.669	-1.163			
	(7.656)	(8.201)			
			Panel C: 2SLS		
Tariff*Post	-301.343**	-259.025*	-384.939**	-269.317**	-417.248**
	(126.151)	(133.249)	(185.677)	(131.464)	(165.115)
Post	0.100	-2.022			
	(7.076)	(7.567)			
			Panel D: First Stage		
Traded Tariff*Post	0.105***	0.097***	0.072***	0.099***	0.081***
	(0.020)	(0.018)	(0.014)	(0.018)	(0.013)
Post	-0.009	-0.003			
	(0.012)	(0.011)			
N	9583	8564	8564	8564	8564
Individual Controls	No	Yes	Yes	Yes	Yes
District Specific Linear Trends	No	No	No	Yes	Yes
Initial District conditions*Post	No	No	Yes	No	Yes

Note: The covariates included in the regression are household income, years of schooling of the oneself and spouse, dummies for year of marriage and year of birth, whether the household owns land, acres of inherited land and current land holdings. The standard errors are clustered at the district-year level. All specifications include district and year of marriage fixed effects. Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 4: Change in Female Employment Relative to Male Employment

	(1) $\log(\frac{WE_f}{WE_m})$	(2) $\log(\frac{SE_f}{SEm})$	(3) $\log(\frac{workdays_f}{workdays_m})$	(4) $\log(\frac{WE_f}{Pop_f})$	(5) $\log(\frac{LFPR_m}{Pop_m})$	(6) $\log(\frac{SE_m}{Pop_m})$
Tariff*Post	21.866**	10.768	23.847**	21.127**	0.838	1.444
	(10.690)	(7.610)	(11.395)	(9.189)	(0.844)	(2.418)
Post	-33.329*	-34.902**	-31.767	-28.127	-3.695**	1.857
	(19.689)	(14.688)	(20.121)	(17.359)	(1.475)	(4.544)
N	61233	63541	62047	30072	32610	32610
IV with Traded Tariffs	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Initial District conditions*Post	Yes	Yes	Yes	Yes	Yes	Yes

Note: Data Source: National Sample Survey (Employment -Unemployment) 1987 (43rd) and 1999 (55th) survey rounds. Dependent variable:
Column(1):log of ratio of female to male employment in salaried or casual work
Column(2): log of ratio of females to males in self-employment
Column(3): log of ratio of female to male total days of employment in a reference week
Column(4): log of share of female wage employment from the total female population
Column(5): log of share of male labour participation from total male population

Standard errors are clustered at the district-year level. The regressions are weighted by the total district population of males and females who are 15-30 years old . Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 5: Trade Liberalization and Change in Male Operations

	(1) Ploughing	(2) Harvesting	(3) Other Cultivation Activity	(4) Other Agricultural activity	(5) Manual Work(non-agriculture)
Tariff*Post	-1.028***	1.870*	-0.845	0.517	-0.508
	(0.341)	(0.986)	(1.014)	(0.545)	(0.607)
Post	1.677**	-2.861	3.125*	-1.795*	-4.090***
	(0.852)	(1.826)	(1.687)	(0.926)	(0.897)
N	24167	24167	24167	24167	24167
IV with Agricultural Traded Tariffs	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes
Initial Region conditions*Post	Yes	Yes	Yes	Yes	Yes

Note: Data Source: National Sample Survey (Employment -Unemployment) 1983 (38th) and 1999 (55th) survey rounds. Initial region conditions that are interacted with the post-reform indicator include percentage of workers in a region employed in agriculture, employed in mining, employed in manufacturing, employed in trade, employed in transport, and employed in services (construction is the omitted category), as well as the share of districts population that is schedule caste/tribe, the percentage of literate population. Standard errors are clustered at the region-year level. Significance levels: * $p<0.1$, ** $p<0.05$, *** $p<0.01$

Table 6: Trade Liberalization and Change in Female Operations

	(1) Transplanting	(2) Weeding	(3) Harvesting	(4) Other cultivation activity	(5) Other agricultural activity	(6) Manual work(non-agriculture)
Tariff*Post	-0.117	0.538	3.432**	-0.653	-0.556	-1.139
	(0.374)	(0.631)	(1.607)	(1.817)	(0.646)	(1.057)
Post	-1.738	-0.100	-9.769**	4.358	1.298	-1.538
	(1.566)	(2.001)	(4.245)	(3.355)	(1.928)	(3.027)
N	9313	9313	9313	9313	9313	9313
IV with Agricultural Traded Tariffs	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Initial Region conditions*Post	Yes	Yes	Yes	Yes	Yes	Yes

Note: Data Source: National Sample Survey (Employment -Unemployment) 1983 (38th) and 1999 (55th) survey rounds. Standard errors are clustered at the region-year level. Initial region conditions that are interacted with the post-reform indicator include percentage of workers in a region employed in agriculture, employed in mining, employed in manufacturing, employed in trade, employed in transport, and employed in services (construction is the omitted category), as well as the share of districts population that is schedule caste/tribe, the percentage of literate population. Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 7: Female-Male Wage Gap

	(1) 25th prcentile	(2) Median	(3) 75th percentile
Panel A: With Overall Traded Tariffs			
$Dependent\ Variable: log(\frac{Wage_f}{Wage_m})$			
Tariff*Post	3.664*	4.394	-2.385
	(1.977)	(3.002)	(1.649)
Post	2.382	5.913	3.603
	(2.938)	(3.749)	(3.201)
Panel B: With Agricultural Traded Tariffs			
Tariff*Post	3.897**	4.315*	0.336
	(1.690)	(2.418)	(1.995)
Post	2.203	5.973	1.515
	(2.918)	(3.916)	(3.526)
N	40091	40091	40091
IV with Traded Tariffs	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes
Initial Region conditions*Post	Yes	Yes	Yes

Note: Data Source: National Sample Survey (Employment -Unemployment) 1983 (38th) and 1999 (55th) survey rounds. The dependent variable is log of ratio of female to male wages at different percentiles in the wage distribution. Initial region conditions that are interacted with the post-reform indicator include percentage of workers in a region employed in agriculture, employed in mining, employed in manufacturing, employed in trade, employed in transport, and employed in services (construction is the omitted category), as well as the share of districts population that is schedule caste/tribe, the percentage of literate population. Standard errors are clustered at the region-year level. Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 8: Heterogeneous Effects - Change in Female Employment Relative to Male Employment

	(1) $\log(\frac{WE_f}{WE_m})$	(2) $\log(\frac{SE_f}{SEm})$	(3) $\log(\frac{workdays_f}{workdays_m})$	(4) $\log(\frac{WE_f}{Pop_f})$	(5) $\log(\frac{LFPR_m}{Pop_m})$
Panel A: Less Traditional States					
Tariff*Post	22.639**	12.513	28.528**	25.255**	-0.153
	(11.105)	(7.659)	(14.352)	(10.684)	(0.629)
Post	-18.128	-60.986**	-29.456	-15.325	-0.941
	(26.636)	(28.101)	(35.095)	(26.788)	(1.659)
N	30465	30465	30465	15280	15185
Panel B: More Traditional States					
Tariff*Post	-8.083	64.284	-20.331	13.920	6.144
	(53.803)	(67.724)	(44.708)	(59.074)	(4.082)
Post	-32.331	-22.205	-12.422	-28.678	-6.146***
	(26.608)	(21.004)	(19.265)	(24.815)	(1.551)
N	31214	33535	32033	15021	17650
IV with Traded Tariffs	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes
Initial District conditions*Post	Yes	Yes	Yes	Yes	Yes

Note: Data Source: National Sample Survey (Employment -Unemployment) 1987 (43rd) and 1999 (55th) survey rounds. Dependent variable:
Column(1):log of ratio of female to male employment in salaried or casual work
Column(2): log of ratio of females to males in self-employment
Column(3): log of ratio of female to male total days of employment in a reference week
Column(4): log of share of female wage employment from the total female population
Column(5): log of share of male labour participation from total male population

Standard errors are clustered at the district-year level. The regressions are weighted by the total district population of males and females who are 15-30 years old . Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 9: Heterogeneous Effects- Reduced Form Effect of Trade Liberalization on Dowry

	(1)	(2)	(3)	(4)	(5)	(6)
		OLS			2SLS	
Panel A: Less Biased States						
Tariff*Post	-143.486**	-142.632**	-146.487**	-386.742**	-225.363	-225.363
	(65.760)	(66.494)	(62.435)	(188.615)	(147.969)	(147.969)
Post	-17.638***	-16.556**	344.558	825.774*	-21.695	-21.695
	(6.413)	(6.892)	(249.883)	(466.269)	(14.205)	(14.205)
N	4336	3829	3829	3829	3829	3829
Panel B: More Biased States						
Tariff*Post	-53.520	-52.150	371.322*	-341.928	-2182.091	-185.692
	(39.016)	(37.691)	(214.297)	(590.824)	(10575.722)	(574.530)
Post	-3.565	-4.185	164.214	401.800	20.170	331.935
	(2.759)	(2.852)	(255.048)	(301.993)	(99.109)	(295.799)
N	5291	4768	4768	4768	4768	4768
Mean of Dependent Variable	19.626	19.565	19.565	19.565	19.565	
IV with Traded Tariffs	No	No	No	Yes	Yes	Yes
District Specific Linear Trends	No	No	No		NoYes	Yes
Initial District conditions*Post	No	Yes	Yes	Yes	No	Yes

Note: Data Source: REDS survey(1982 and 1999 wave). The dependent variable is real netdowry (in 1999 rupees). The individual covariates included in the regression are household income, years of schooling of the oneself and spouse, dummies for year of marriage and year of birth, whether the household owns land, acres of inherited land and current land holdings. Each specification includes district fixed effects and year of marriage fixed effects. The standard errors are clustered at the district-year level. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table 10: IV-Labour Market Participation and Dowry

	(1)	(2)	(3)	(4)	(5)
	Least Biased States			More Biased States	
Female LFPR*Post	353.687				
	(274.834)				
Female Casual Labour *Post		-173.816*		132.482	
		(90.184)		(280.494)	
Female Wage Employed*Post			-292.166*		50.525
			(156.185)		(97.881)
N	3829	3829	3829	4735	4735
IV with Traded Tariffs	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes
Initial District conditions*Post	Yes	Yes	Yes	Yes	Yes

Note: The covariates included in the regression are household income, years of schooling of the oneself and spouse, dummies for year of marriage and year of birth, whether the household owns land, acres of inherited land and current land holdings. The standard errors are clustered at the district-year level. All specifications include district and year of marriage fixed effects. Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 11: Marriage Market Matching for Females

	(1) Years of Schooling	(2) Land Owned-Extensive	(3) Size of Land Owned-	(4) Distance to Natal Home	(5) Inter-caste
Tariff*Post	-2.484	0.924	-2692.326	-148.623	2.279
	(16.581)	(2.113)	(2085.712)	(113.878)	(1.645)
Post	-22.926	-2.985	-8220.277	-215.687	2.092
	(29.461)	(3.287)	(6092.571)	(228.479)	(2.064)
N	4100	4100	1934	4100	4100
Mean of Dependent Variable	6.341	0.472	501.945	19.188	0.074
IV with Traded Tariffs	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes

Note: Data Source: REDS survey(1982 and 1999 wave). The dependent variables denote the different characteristics of the husband. The covariates included in the regression are household income, years of schooling of the oneself and spouse, dummies for year of marriage and year of birth, whether the household owns land, acres of inherited land and current land holdings. The standard errors are clustered at the district-year level. Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table 12: Reduced Form Effect of Trade Liberalization on Marriage Market Sex Ratio and Income

	(1) Sex Ratio in Marriage Market	(2) Real Household Income ('000 Rupees)
Tariff*Post	1018.725	-1033.493
	(1029.276)	(770.542)
Post	-2225.344	1958.483*
	(1904.852)	(1073.870)
N	190	12007
Data Source	1991 Indian Population Census	REDS 1982, 1999

Note: Column(1) is a district level regression and Column(2) is household level regression. Tariff is instrumented by Traded Tariff. All the regressions include district fixed effects and a post-reform indicator interacted with intial district indicators listed in Table 3. The standard errors are clustered at the district-round level. Significance levels: * p<0.1, ** p<0.05, *** p<0.01

APPENDIX: FIGURES AND TABLES

Figure A.1: Proportion of Marriages Outside the District

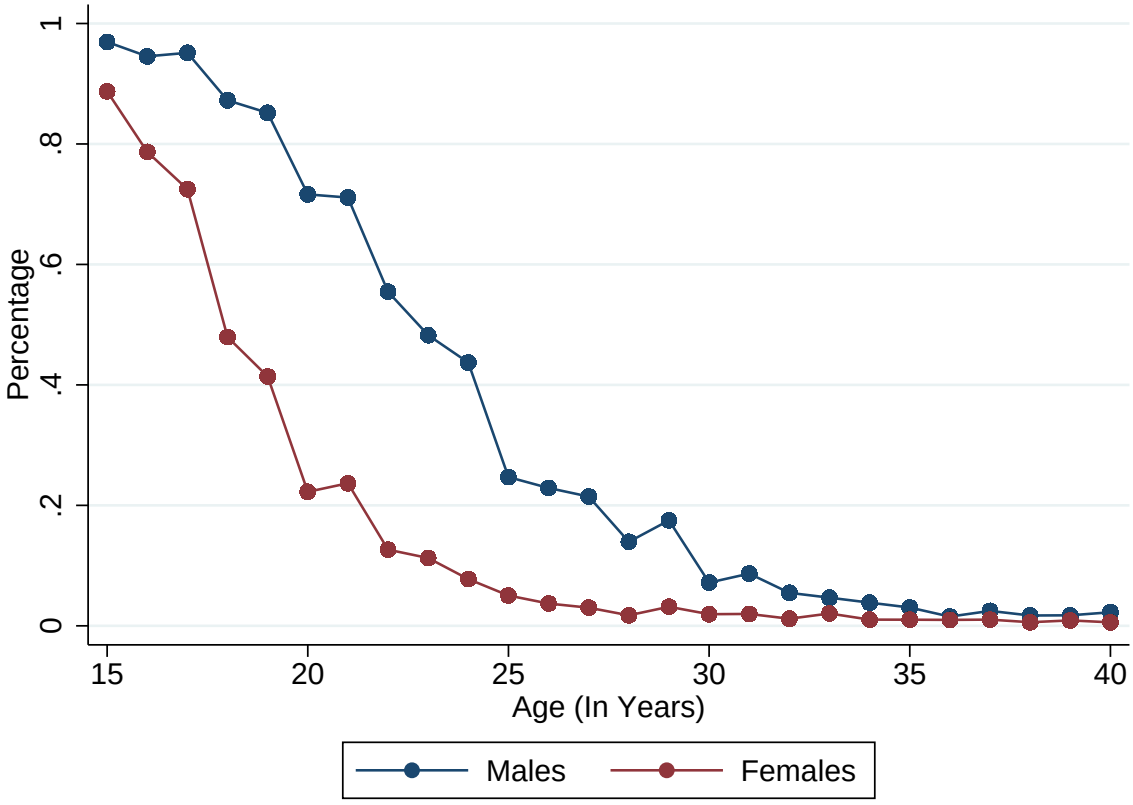


Figure A.2: Proportion of Never Married Males and Females by Age

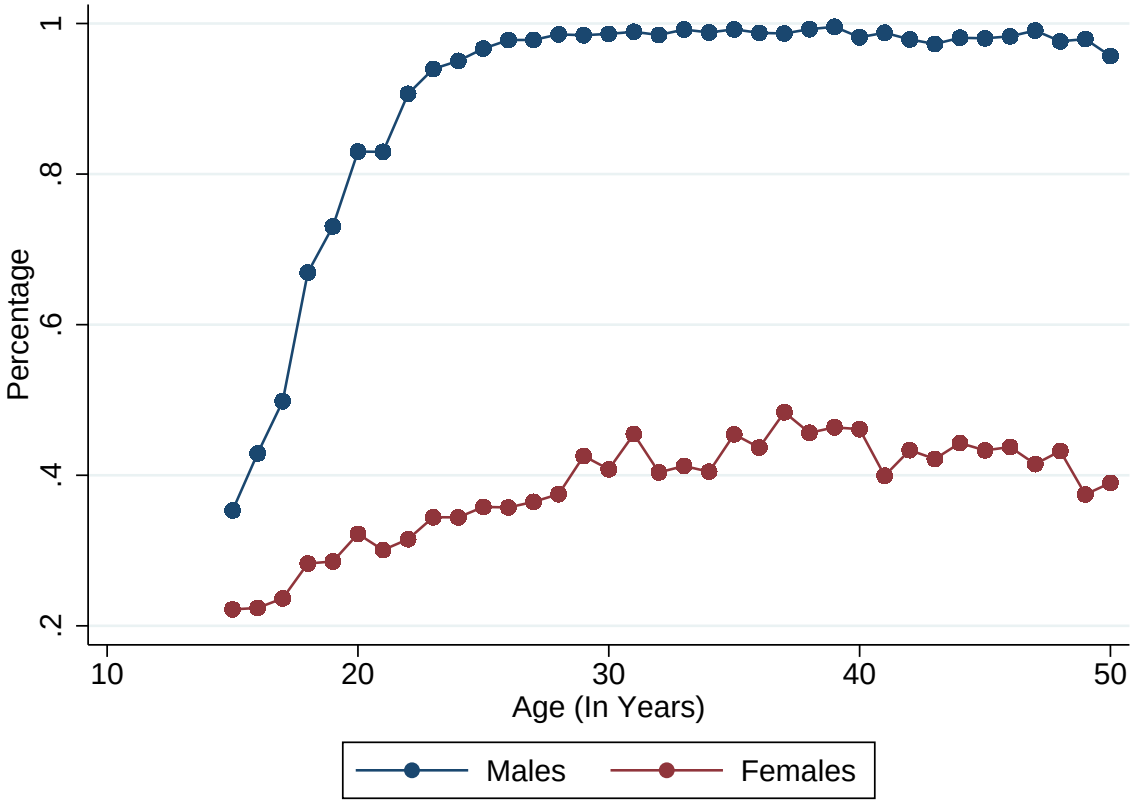


Figure A.3: Proportion of Males and Females in Labour Force by Age

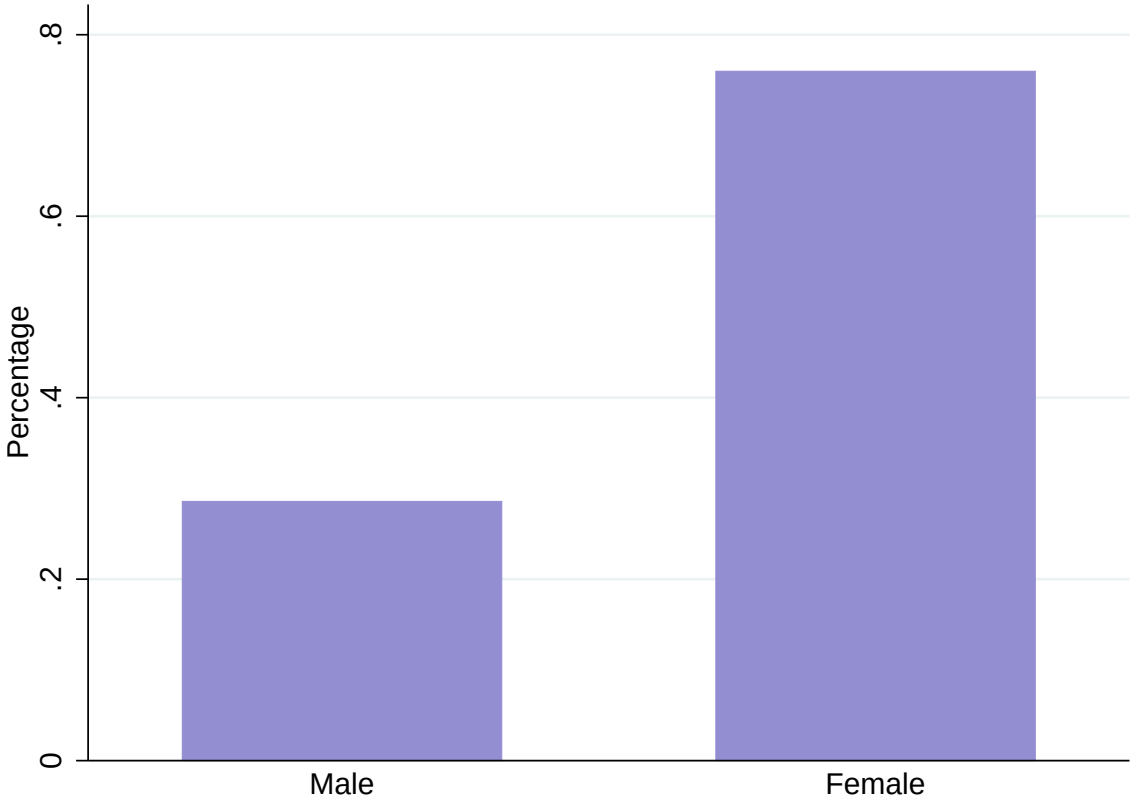


Figure A.4: Proportion of unpaid Family Labour among Self-employed by

Table A.1: Dowry Received by Head of the Household and Workforce Force Participation of Wife

	(1) All States	(2) Most Biased States	(3) Medium Biased States	(4) Least Biased States
Wife's Work Force Participation	-2154.209***	-1504.902	-2086.909***	-2651.532***
	(633.962)	(2164.270)	(502.304)	(874.543)
Land Owned by Spouse's Parents	0.442	0.041	-0.407	0.949
	(0.675)	(0.828)	(0.340)	(1.235)
Occupation of Spouse's Father	262.354	695.118*	-231.509	92.467
	(416.931)	(382.799)	(217.947)	(830.036)
Occupation of Spouse's Mother	-0.529	81.477	213.909**	227.803
	(227.424)	(263.732)	(78.614)	(299.843)
Household Income	3.263	8.114***	0.092	4.129
	(2.216)	(0.931)	(1.152)	(3.044)
Land Owned by Head's Parents	0.481	-0.872	0.672	0.357
	(0.516)	(0.565)	(0.478)	(0.751)
Years of Schooling of Husband	400.758***	244.562**	219.738	729.320***
	(106.171)	(114.512)	(134.550)	(194.434)
Years of Schooling of Wife	1032.230***	348.388	648.494***	1095.414***
	(171.573)	(202.274)	(200.000)	(297.036)
N	1854	363	498	960
Year Fixed Effects	Yes	Yes	Yes	Yes

Note: Data Source: REDS survey(1999 wave). The regression includes data only for first marriage couples. The standard errors are clustered at the year of marriage level. Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table A.2: Pre-trends- Reduced Form Effect of Trade Liberalization on Dowry

	(1)	(2)	(3)	(4)	(5)
			Panel A: OLS		
Tariff*Post	-69.470	-85.279	19.130	-76.348	53.170
	(57.791)	(58.354)	(63.569)	(58.437)	(66.078)
Post	-15.158***	-15.745***			
	(4.606)	(4.984)			
			Panel B: 2SLS		
Tariff*Post	256.550*	240.843	54.994	217.310	-28.280
	(154.834)	(185.804)	(247.669)	(180.996)	(221.245)
Post	-31.328***	-32.284***	477.533	-44.781***	562.116*
	(8.878)	(10.725)	(352.746)	(13.146)	(330.629)
N	8313	7585	7585	7585	7585
District Specific Linear Trends	No	No	No	Yes	Yes
Initial District conditions*Post	No	No	Yes	No	Yes

Note: The covariates included in the regression are household income, years of schooling of the oneself and spouse, dummies for year of marriage and year of birth, whether the household owns land, acres of inherited land and current land holdings. The standard errors are clustered at the district-year of marriage level. Post-reform indicator refers to the years from 1985-91. All regressions include district and year of marriage fixed effects. Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table A.3: Reduced Form Effect of Trade Liberalization on Dowry- Including Other Reforms

	(1)	(2)	(3)	(4)
Tariff*Post	-384.942**	-389.011**	-276.423**	-298.947*
	(177.195)	(178.564)	(112.750)	(176.041)
FDI	9.736			
	(8.160)			
Licensed Industrues		-7.208		
		(14.961)		
NTB			171.372*	
			(91.198)	
Number of banks per 1000 people				-53.622***
				(19.334)
N	8564	8564	8564	8564
Mean of Dependent Variable	31.221	31.221	31.221	31.221
IV with Traded Tariffs	Yes	Yes	Yes	Yes
Initial District conditions*Post	Yes	Yes	Yes	Yes

The covariates included in the regression are household income, years of schooling of the oneself and spouse, dummies for year of marriage and year of birth, whether the household owns land, acres of inherited land and current land holdings. The standard errors are clustered at the district-year level. All regressions include district and year of marriage fixed effects. Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table A.4: Female Wage Contribution in the Household

	(1)	(2)	(3)	(4)
	OLS		IV	
	15-25	15-30	15-25	15-30
Tariff*Post	-636.802***	-152.364	-1176.384**	-629.847
	(234.610)	(247.109)	(508.933)	(530.206)
Post	2078.838	6362.715***	1523.371	5921.909***
	(1882.138)	(1107.801)	(2005.912)	(1243.306)
N	6609	10133	6609	10133
IV with Traded Tariffs	No	No	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Initial Region conditions*Post	Yes	Yes	Yes	Yes

Note: Data Source: National Sample Survey (Employment -Unemployment) 1983 (38th) and 1999 (55th) survey rounds. The dependent variable is average wage of females in the household. Initial region conditions that are interacted with the post-reform indicator include percentage of workers in a district employed in agriculture, employed in mining, employed in manufacturing, employed in trade, employed in transport, and employed in services (construction is the omitted category), as well as the share of district's population that is schedule caste/tribe, the percentageof literate population. Standard errors are clustered at the district-year level. Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table A.5: Marriage Market Matching for Males

	(1) Years of Schooling	(2) Land Owned-Extensive Margin	(3) Size of Land Owned	(4) Inter-caste
Tariff*Post	-5.495	106.709	-210429.031	-2.020
	(14.000)	(76.389)	(180471.828)	(1.271)
Post	-25.213	173.359	-343558.435	-3.600**
	(23.360)	(130.079)	(323100.766)	(1.693)
N	5567	1043	769	5567
Mean of Dependent Variable	4.121	0.737	629.597	0.068
IV with Traded Tariffs	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes

Note: Data Source: REDS survey(1982 and 1999 wave). The dependent variables denote the different characteristics of the wife. The covariates included in the regression are household income, years of schooling of the oneself and spouse, dummies for year of marriage and year of birth, whether the household owns land, acres of inherited land and current land holdings. The standard errors are clustered at the district-year level. Data on land holdings of wife's parents is available in the demographic survey. Columns(2) and (3) merge the data from the demographic survey because of which the number of observations change. Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table A.6: Trade Liberalization and Poverty in Rural India

	(1) Poverty rate	(2) Log of Per Capita Consumption
Tariff*Post	2.393	-4.211
	(2.211)	(3.476)
Post	-2.273	7.535*
	(2.735)	(4.108)
N	190	190
IV with Traded Tariffs	Yes	Yes
District fixed effects	Yes	Yes
Initial District conditions*Post	Yes	Yes

Note: Data Source: National Sample Survey (Employment -Unemployment) 1987 (43rd) and 1999 (55th) survey rounds. The poverty measures are derived directly from Topalova(2010). The dependent variable is the district level poverty rate in Column(1) and log of average monthly per capita consumption expenditure in Column(2). The sample is restricted to the REDS districts. Standard errors are clustered at the district-year level. The regressions are weighted by the number of households in the district used to calculate the poverty measure. Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table A.7: Change in Proportion of Never Married Population

	(1) 15-20	(2) 20-25	(3) 25-30
Panel A: Proportion of Never Married Females			
Tariff*Post	-1.004	-2.631***	0.014
	(1.312)	(1.008)	(0.324)
Post	1.154	2.272	-0.061
	(2.498)	(1.954)	(0.636)
N	12846	12426	11961
Panel B: Proportion of Never Married Males			
Tariff*Post	- 1.165	-3.291**	-1.595
	(1.235)	(1.636)	(0.998)
Post	2.981	5.935**	3.692
	(2.229)	(2.909)	(2.245)
N	13999	12340	11991
IV with Traded Tariffs	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes
Initial District conditions*Post	Yes	Yes	Yes

Note: Data Source: National Sample Survey (Employment -Unemployment) 1987 (43rd) and 1999 (55th) survey rounds. Standard errors are clustered at the district-year level. The population is split into 5 year age categories in each Column. The regressions are weighted by the total district population of males and females who are 15-30 years old . Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table A.8: Trade Liberalization and Pre-marital Investments

	(1)	(2)	(3)	(4)
	Years of Schooling		Age at Marriage	
Males	Females	Males	Females	
Scaled Tariff	-23.675	-20.332	-21.171	-7.883
	(20.159)	(16.402)	(19.318)	(20.028)
Post	8.168	-0.215	37.932	-2.651
	(28.363)	(22.663)	(29.099)	(27.461)
N	8681	8681	4994	3687
Initial District conditions*Post	Yes	Yes	Yes	Yes

Note: The covariates included in the regression are the real household income, dummies for caste and religion. The standard errors are clustered at the district-year level. All specifications include district and year of marriage fixed effects. Significance levels: * p<0.1, ** p<0.05, *** p<0.01

Table A.9: Table of Summary Statistics-Pre Reform (1982)

	(Biased States)		Less Biased States	
	mean	sd	mean	sd
Real Net Dowry(in '000 Rupees)	22.19	35.91	52.47	82.12
Age at Marriage(Females)	18.47	2.43	20.08	3.20
Age at Marriage(Males)	20.40	3.20	23.54	3.98
Years of Schooling(Male)	6.12	5.17	6.49	4.85
Years of Schooling(Female)	2.77	4.09	4.80	4.34
Current Land Holdings	247.74	549.74	166.39	492.10
Spouse owns Land	0.48	0.50	0.43	0.50
Distance	23.70	189.41	19.42	88.57
Inter-Caste	0.08	0.27	0.06	0.23
Real Household Income(in '000 Rupees)	44.97	38.69	36.99	35.07
Observations	3336		2580	

Table A.10: Reduced form effect of Trade Liberalization on Log(Real Net Dowry)

	(1) OLS	(2) OLS	(3) RF	(4) 2SLS
Tariff*Post	-3.989***	-2.925***		-10.865**
	(1.028)	(1.055)		(5.457)
Traded Tariff*Post			-0.779**	
			(0.374)	
N	7970	7970	7970	7970
IV with Traded Tariffs	No	No	No	Yes
Individual Controls	Yes	Yes	Yes	Yes
District Specific Linear Trends	No	Yes	No	No
Initial District conditions*Post	Yes	Yes	Yes	Yes

Note: The specification includes all the individual control variables and district specific variables included in the main specification shown in Table 3. The number of observations are different as 0 dowries are excluded from the regression. All specifications include district and year of marriage fixed effects. Significance levels: * p<0.1, ** p<0.05, *** p<0.01