Essays on the Role of Property Rights in Economic Development

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Thesis submitted to the Department of Economics of the London School of Economics for the degree of Doctor of Philosophy.

August 2010

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Declaration

I certify that this thesis is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

Sanchari Roy

Abstract

This thesis examines the importance of property rights in the process of economic development of poor countries.

The first chapter examines the impact of female property inheritance rights on human capital investment of women. Using plausibly exogenous variation created by amendments to the female inheritance law in India, I find that exposure to improved female inheritance rights increased the mean educational attainment of women. I also provide some suggestive evidence that the mechanism behind such an effect may be explained by the complementarity between female inheritance rights and education in the context of household property management rather than by a relaxation in the household budget constraint following reduction in dowry payments at the time of marriage.

The second chapter looks at the intergenerational impact of improving mothers' property inheritance rights on their children's education. Using the same legal amendment to female inheritance laws as in chapter 1, I find that stronger inheritance rights of mothers had a positive impact on the mean education level of their daughters, but had little effect on that of sons. The chapter also provides suggestive evidence that the underlying mechanism of this effect appears to be an improvement in mothers' intra-household bargaining power rather than their increased access to credit as a result of improvement in inheritance rights following the reform.

The third chapter (joint with Maitreesh Ghatak) examines the impact of land reform legislation, aimed at strengthening property rights, on agricultural productivity in India. We find heterogeneous treatment effects of land reform on productivity, both across types of land reform as well as across states of India. We argue that a plausible explanation for such observed inter-state heterogeneity in land reform experience may be found in the differential emphasis laid by states on different components of land reform, in particular ceiling versus tenancy laws.

Acknowledgments

I would first like to thank my supervisors Maitreesh Ghatak and Oriana Bandiera for their continuous advice and support throughout these past few years. Their intellectual guidance and constant encouragement has been indispensable in keeping me focussed and productive.

I have also benefited immensely from conversations with a number of my fellow students, including Madhav Aney, Fernando Aragon, Konrad Burchardi, Jin Wang, Giovanni Ko and especially, Erlend Berg, who have all have been kind enough to listen to my ideas on numerous occasions and provided very useful comments and feedback.

Financial support from the LSE, the DFID-funded research consortium on Improving Institutions for Pro-Poor Growth (iiG) and the India Observatory is gratefully acknowledged.

I would also like to thank Amit Shovon Ray and Ashok Sanjay Guha, without whose help and encouragement I would probably never have embarked on a PhD.

I am also grateful to my parents, Manashi and Sushanta Roy, who have always been my pillars of strength, and to my brother, Somaditya, for believing in me.

Last but not least, I am grateful to Sabyasachi Mukherjee for his unwavering support over the past few years, not just as a husband but also as a fantastic friend.

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Preface

Ever since North (1990), there has been an increasing recognition of the need for an explicit departure from the assumption of an institution-free and frictionless world that underpins neoclassical growth theory. Indeed, the new institutional approach to development economics argues that the differences in growth experience across countries can be attributed to differences in institutions rather than different paths of factor accumulation as propounded by neoclassical growth models (North and Thomas, 1973; Acemoglu, Johnson, and Robinson, 2005).

North (1990) defines institutions as "the rules of the game in a society, or more formally, the humanly devised constraints that shape human interaction." Within the broad gamut of institutions, property rights are of primary importance to economic outcomes as they influence the structure of incentives in society. Without well-defined property rights, individuals would not have the incentive to invest in physical and human capital, or adopt more efficient technologies. Enforceable property rights make investment in physical and human capital and technology more profitable and constitute the foundation of sustained economic growth.

The central goal of this thesis is to explore the interplay between property rights and economic development, within the context of the household and the agricultural sector. A considerable body of research has examined the role of property rights institutions in promoting economic growth (Acemoglu, Johnson, and Robinson, 2001, 2002; Engerman and Sokoloff, 1997; Banerjee and Iyer, 2005) etc. However, much of this literature has typically focussed on the role of property rights in the context of physical investment, while its role with regard to human capital investment has been relatively under-researched. In addition, most of the existing research is gender-neutral, with little attention to the salience of property rights specifically with regard to women.

The first two chapters of this thesis attempt to fill these gaps by empirically analyzing the impact of property rights expansion in the context of a legal amendment to female property inheritance laws in India. Obtaining evidence on the causal impact of property rights is typically complicated by the problem of potential endogeneity. Unobserved heterogeneity at the household level correlated with both property rights and female outcomes may bias conventional estimates of the impact of property rights. To that extent, the legislative change in female inheritance laws provides a source of plausibly ex-

ogenous variation in property rights that can be exploited to identify their causal impact.

Like most personal laws in India, property inheritance laws, too, vary by religion. The fundamental law governing present day inheritance rights of four religions i.e. Hinduism, Buddhism, Jainism and Sikhism, called the Hindu Succession Act of 1956, was designed to lay down a law of succession whereby sons and daughters would enjoy equal inheritance rights. In fact, however, significant gender inequalities persisted that disadvantaged the daughter considerably. The main source of bias came from joint family property, to which sons enjoyed right *by birth* to an independent share but daughters did not. Due to the fact that a considerable amount of property, especially land in rural areas, is still jointly owned, such biased rights had a crippling effect on the position of women in India.

Inheritance is a "concurrent" topic in the Indian constitution, i.e. one over which both the central government as well as state governments have legislative authority. The first attempts at amending this law came from five Indian states, namely Andhra Pradesh, Tamil Nadu, Kerala, Karnataka and Maharashtra, between late 1970s and early 1990s, which granted daughters equal share in the joint family property just like their brothers. The amendments stated that women who were unmarried at the time the reform was passed in their state could benefit from the new improved rules of inheritance.

The first chapter explores the impact of this inheritance rights reform on the human capital investment of women. I find that women who were exposed to the reform gained an average of 1.1 to 1.3 years of education (an increase of 19 to 24 percent) compared to those who were not. Moreover, this effect is only observed for Hindu, Buddhist, Sikh and Jain women, to whom the law applied, and not for Muslim, Christian, Jew or Parsi women who are governed by separate personal laws. I also provide some suggestive evidence that the underlying mechanism of this effect may be explained by the complementarity between female property inheritance rights and education in the context of household property management rather than by a relaxation in the household budget constraint following a reduction in dowry.

The second chapter analyzes the intergenerational impact of the inheritance rights reform on children of the women examined in chapter 1. In particular, this chapter looks at the education of these children. Owing to the possibility that some of the children of these mothers (in particular, girls) may *themselves* be exposed to the reform, the analysis is restricted to only those children who

were all fully exposed to the reform. Controlling for the education level of mothers, I find that strengthening of mothers' property rights, following their exposure to the reform, is associated with an average increase of 1.2 years of education for daughters (an improvement of 18 percent), but had little effect on that of sons. I also provide some suggestive evidence that the underlying mechanism of this effect appears to be an improvement in the bargaining power of these mothers rather than their increased access to credit as a result of improved inheritance rights following their exposure to the reform.

In light of evidence documenting the importance of asset ownership for women's bargaining power, livelihood opportunities, and intrahousehold allocation of resources towards consumption and investment (Thomas, 1990, 1992; Duflo, 2003), legal barriers to women's ability to inherit property may arguably be at the root of broader patterns of inequality. The findings of these two chapters suggest that, despite the complexity of underlying social and cultural dynamics, legal changes to improve women's inheritance rights could provide a low cost means of reducing gender discrimination and improving socio-economic outcomes, both contemporaneously as well as across generations.

The third chapter (jointly written with Maitreesh Ghatak) is quite distinct from the first two in that it returns to the discussion of the role of property rights in the context of production incentives typically addressed in the existing literature. However, an important similarity it shares with the first two is that this chapter also examines the impact of a legislative change to property rights institutions in India, in this case, land reform. Land reform usually refers to redistribution of land from the rich to the poor. In a broader sense, it also includes regulation of ownership, operation, leasing, sales, and inheritance of land.

The Indian experience with land reforms, comprising of tenancy reforms, abolition of intermediaries, land ceilings and land consolidation, has often been described as one of the most extensive in the world (Thorner, 1976). However, evidence on the efficacy of land reform, in particular with regard to agricultural productivity in India, has been mixed. While, on the one hand, Besley and Burgess (2000) find a negative impact of land reform on productivity, Banerjee, Gertler, and Ghatak (2002) find a positive effect.

This chapter attempts to shed light on possible reasons behind such apparent disparity by arguing that the negative aggregate effect of land reform actually hides considerable variation across types of land reform, as well as

across states. Disaggregating by type of land reform, the main driver of this negative effect appears to be land ceiling legislation, while the effect of tenancy reform is positive. We also find evidence of considerable heterogeneity in the effect of land reform across different states of India. We argue that a plausible explanation for such inter-state heterogeneity in land reform experience may be found in the differential emphasis laid by states on different components of land reform, particularly ceiling versus tenancy reform.

An aggregate analysis of the efficacy of land reform may also conceal potential indirect and unintended consequences of land reform that may partially undo its direct positive effects as predicted by theory. For example, regulation of tenancy in the form of security of tenure may have the negative effect of reducing the incentive of landowners to lease out land, which may work against the positive effect of the reform that operates through the reduction in Marshallian sharecropping distortions. In this chapter, we find evidence that tenancy reforms are associated with increased inequality in the distribution of operational land holdings in states where they were not well-enforced. We interpret this as suggestive evidence that landlords may have been engaging in anticipatory eviction of tenants in response to land reform.

It is, however, important to point out that all three chapters of this thesis look at specific legislative changes to property rights institutions in India. To the extent that the empirical findings of these chapters are context-specific, their generalizability may be somewhat restricted. However, the analysis regarding the underlying mechanisms of these effects partially ameliorates this concern because, as Pawson and Tilley (1997) argue, a thorough understanding of the combination of mechanism and context that generates outcomes is what pushes the boundaries of our knowledge as well as enables us to take research findings to policy.

Chapter 1

Empowering Women: Inheritance Rights and Female Education in India

1.1 Introduction

The role of property rights in the process of economic development has been well-emphasized in the economic literature (North, 1990; De Soto, 2000, 2001; Besley, 1995; Banerjee, Gertler, and Ghatak, 2002; Field, 2007; DiTella, Galiani, and Schargrodsky, 2007). Property rights, through their impact on distribution of wealth, patterns of production as well as development of markets, especially credit markets, have evolved as one of the prerequisites of economic growth and poverty reduction (Besley and Ghatak, 2009). The primary focus of this literature has been to study the impact of property rights on physical investment, but the role of property rights in the context of human capital investment is relatively under-researched. Moreover, most of the existing research remains gender-neutral, with little attention to the salience of property rights for women. This chapter attempts to fill these gaps by studying the impact of property rights, particularly inheritance rights, on the human capital investment of women.

The principal methodological problem faced in estimating the causal impact of property rights at the household level is that of potential endogeneity. There could be unobserved heterogeneity at the household level correlated with both female education and female property rights that may generate spurious results. For example, gender progressive parents may be more likely to invest

in their daughters' education as well as give them greater rights to family inheritance. This could lead to the classic omitted variable problem that would bias the estimates of the impact of female property rights on education of women. A second complication in this regard may arise due to measurement error as it is often difficult to obtain appropriate measures of female property rights due to the fact that women in many societies lack formal titles to property (Deere and Leon, 2003; Sweetman, 2008). This may introduce further biases in the estimates of the causal impact of female property rights.

To address these problems, this chapter exploits plausibly exogenous variation created by a legislative change in the female inheritance law of India to evaluate the effect of property inheritance rights of women on their education. Like most personal laws in India, property inheritance laws, too, vary by religion. The fundamental law governing present day inheritance rights of four religious communities i.e. Hindus, Buddhists, Jains and Sikhs, called the Hindu Succession Act of 1956, was designed to lay down a law of succession whereby sons and daughters would enjoy equal inheritance rights. In fact, however, significant gender inequalities persisted that disadvantaged the daughter considerably. The main source of bias came from joint family property, to which sons enjoyed right *by birth* to an independent share but daughters did not. Both had equal rights of inheritance to the separate property that their father accumulated during his lifetime. But, due to the fact that a considerable amount of property, especially land in rural areas, is still jointly owned, such biased rights had a crippling effect on the position of women in India.

The first attempts at amending this law came from five Indian states, namely Andhra Pradesh, Tamil Nadu, Kerala, Karnataka and Maharashtra, between late 1970s and early 1990s, which granted daughters equal share in the joint family property just like their brothers (Agarwal, 1994).[1] The amendments stated that women who were unmarried at the time the reform was passed in their state could benefit from the new improved rules of inheritance, and applied only to Hindus, Buddhists, Jains and Sikhs, but not to Muslims, Christians, Parsis and Jews.

The identification strategy in this chapter uses the fact that exposure to the improved inheritance rights regime was jointly determined by state of birth and year of birth. Not only did a woman have to be born in a state that passed the reform, she also had to be of school-going age when the reform was passed in her

[1]Details regarding each state amendment is available in "The Hindu Succession Act 1956, with State Amendments".

state for it to have any impact on her schooling decisions. Hence, I identify the causal effect of the reform by comparing mean educational attainment of women who were young enough to be exposed to the reform (treatment group) to those who were too old (control group), between reforming and non-reforming states. The identifying assumption is that in the absence of the reform, the change in female educational attainment across cohorts would not have been systematically different in reforming and non-reforming states. Similar strategies have been used by Duflo (2001), Card and Krueger (1992), Lemieux and Card (2001) etc. to estimate the effect of education on earnings.

I use individual level data obtained from multiple waves of the National Family and Health Survey of India (NFHS) for my analysis on female education. In these surveys, women aged 15-49 are interviewed on a number of socioeconomic and demographic dimensions, including age and educational attainment, which enables me to construct groups of women with varying degrees of exposure to the reform depending on their year of birth and state of residence.[2]

The primary finding of this chapter is that an improvement in female inheritance rights was associated with an increase of 1.1 to 1.3 in years of education (an increase of 19 to 24 percent) for the cohorts of women who were of primary school-going age at the time of the passage of reform. Moreover, this effect is only observed for Hindu, Buddhist, Sikh and Jain women, to whom the law applied, and not for Muslim, Christian, Jew or Parsi women who are governed by separate personal laws. In addition, no effect is observed for cohorts that were 16 years or older at the time of the reform, suggesting that the findings are less likely to be driven by correlated unobservables.

This chapter also attempts to shed light on the mechanism behind the observed effect of the inheritance rights reform on female education. There could be two potential channels: the first channel is that greater female inheritance rights may increase the relative "attractiveness" of women in the marriage market and substitute for other dimensions of bridal value i.e. social status, beauty etc.[3] In the presence of strong preference for brides with inheritance, competition among grooms may lower dowry payments demanded from such

[2]There may arise concerns regarding the endogeneity of state of residence in relation to migration, but as section 1.3.2 argues later, the extent of inter-state migration in India is very low.

[3]A groom's family is likely to place a higher value on a potential bride if she stands to inherit property from her parental family, owing to the obvious future financial implications of such inheritance for the groom's family.

brides.[4] This relaxes the bridal household's budget constraint and, under the assumption that parents want to send their daughters to school and are only prevented by their budget constraint, an expansion of female inheritance rights may stimulate greater investment in the education of daughters.

An alternative channel may be that an increase in female inheritance rights may provide parents with direct incentives to invest more in the education of their daughters, owing to the complementarity between education and female inheritance rights in relation to household property management, that directly affects their future household income.

In order to the disentangle the mechanism at work here, I study the effect of the reform on dowry payments of these women made at the time of their marriage. If the effect of the reform operates through the dowry channel, then one should observe dowry payments to decline immediately for the cohorts of women that were of marriageable age at the time the reform was passed. Since these women were too old to go to school at that time, the complementarity channel does not apply in their case, which allows me to identify the effect of the dowry channel. Using individual level data obtained from the Rural Economic and Demographic Survey (1999), I find no impact of the reform on the mean dowry payments of the cohorts of women who were of marriageable age at the time of the reform, which rejects the dowry channel. On the other hand, cohorts of women who were of primary school-going age at the time of reform paid significantly lower dowries. This implies that improved female inheritance rights did not reduce dowry payments for the cohorts of women whose education was not affected by the reform, indicating that the effect goes through education to dowries, which provides suggestive evidence in favour of the complementarity channel.

However, it is important to point out that the above results cannot be claimed to provide conclusive proof against the dowry channel if it was the case that knowledge regarding the reform was not well-disseminated immediately after its enactment. Moreover, the above approach of identifying the underlying mechanism also assumes that the dowry response to the reform is the same across different cohorts of women. If later cohorts exhibited differential effects on dowry payments following exposure to the reform compared to earlier cohorts, then too the above result cannot be taken as refutation of the dowry channel.

[4]Dowry payments, which represent a form of transfer from the bride's family to the groom's family, constitute an integral component of marriage in many traditional societies.

This chapter lies at the intersection of two literatures. First, several scholars have focused on the role of property rights in enhancing investment incentives in agricultural land (Banerjee, Gertler, and Ghatak, 2002; Besley, 1995) etc., residential investment (Field, 2007), entreprenurial investment of retained earnings (Johnson, McMillan, and Woodruff, 2003) etc. To the best of my knowledge, this chapter is one of the first attempts to explore the impact of property rights on human capital investment.

This chapter also relates to the literature on dowry and marriage markets. A number of papers focus on the role of dowry as a spot price that clears the marriage market characterized by assortative wealth matching (Anderson, 2003, 2007; Becker, 1991; Botticini and Siow, 2003; Rao, 1993; Edlund, 2001). Anderson (2004) explains the transition of dowry from being a bequest to its emergence as a "groom price". With regard to marriage markets specifically, a number of papers have examined their impact (through changes in the sex ratio) on household outcomes (Chiappori, Fortin, and Lacroix, 2002) and fertility (Angrist, 2002). More recently, a growing literature has been examining marriage institutions in developing countries, notably Arunachalam and Naidu (2008) who explore the impact of fertility changes on the marriage market matching process, and Field and Ambrus (2008) who analyse the relationship between early marriage and female schooling and predict that enforcing universal minimum legal age of marriage will increase female schooling. This chapter provides an alternative channel, in the form of legal changes to inheritance rights, through which female schooling may be raised.

The remainder of the chapter is organized as follows: the next section describes the institutional background of Hindu inheritance law in India. The third section describes the data and identification strategy. The fourth section presents results on female education, and the fifth section on dowry payments. The final section concludes.

1.2 The Institutional Background

1.2.1 The Hindu Personal (Inheritance) Law

As mentioned earlier, the laws for inheritance of property in India differ by religion. The inheritance rights of Hindus are governed by the Hindu Succession Act of 1956 (HSA), which also governs the rights of Buddhists, Jains and

Sikhs [5]. The Act was built on the foundation of ancient legal doctrines that have prevailed in India since the 12 century A.D., and purported to lay down a law of succession that gave equal rights of inheritance to sons and daughters. In fact, however, significant gender inequalities remained.

A key feature of the legal structure of Hindu inheritance in India is the distinction between "joint family property" and "separate property".[6] Generally speaking, joint family property "consists principally of ancestral property (that is, property inherited from the father, paternal grandfather or paternal great-grandfather), plus any property that was jointly acquired or was acquired separately but merged into the joint property". Separate property, on the other hand, "includes that which was self-acquired (if acquired without detriment to the ancestral estate) and any property inherited from persons other than father, paternal grandfather or paternal great-grandfather" (Agarwal, 1994, p. 85-86).

According to the Hindu Succession Act of 1956, daughters of a "Hindu" male dying intestate (i.e. without leaving a will) were equal inheritors, along with sons, of only their father's separate property and his "notional" portion of joint family property, but had no direct inheritance rights to joint family property itself.[7] Sons, on the other hand, not only inherited their share of the father's own property and his "notional" portion of joint family property, but also had a direct right *by birth* to an independent share of the joint family property. In fact, all persons who acquired interest in the joint family property by birth were said to belong to the "Hindu coparcenary", which is conceptually similar to an exclusive male membership club in relation to the issue of inheritance to which women had no access.

In addition to inheritance, sons could also demand partition of the joint family property while daughters could not. E.g. if the joint family property was a dwelling house, sons (as part of the coparcenary) could demand a partition of the same but daughters were only allowed right of residence but no right of ownership or possession. Hence, the HSA was by no means a gender neutral

[5]These religions are considered to be offshoots of Hinduism and hence are looked upon as being "Hindu-like" religions.

[6]The joint family here is a legal concept and need not coincide with the joint residence or or any other aspect of a common household economy that may be implied in a sociological use of the term (Agarwal, 1994).

[7]The "notional" portion of a person's share in the joint family property would be ascertained under the assumption of a "notional" or hypothetical partition of that property, as if the partition had taken place just before his death.

law.[8]

In order to elaborate, I explain the scenario using a simple example. Let us consider a family consisting of a grandfather and his two sons, Son 1 and Son 2 (see Figure 1.1). It is assumed that the family line begins with the grandfather, such that he has no predecessors. The first son has a son (Grandson 1) and a daughter (Granddaughter 1), while for simplicity, I assume the second son is childless. The grandfather is the owner of ancestral/joint family property, and nobody acquires any additional property during his/her lifetime i.e. "separate" property of any individual is zero.

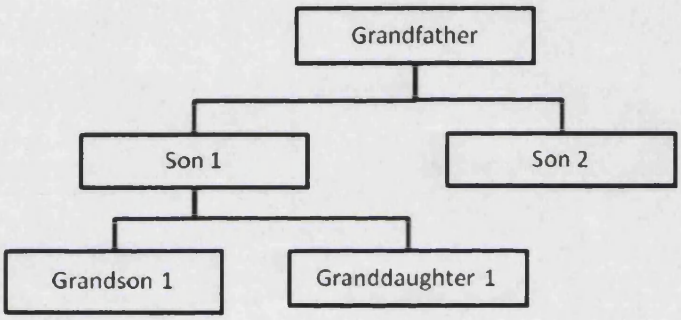

Figure 1.1: Ancestry

The process by which inheritance rights to this ancestral property will be determined in this family is as follows (see Figure 1.2): Grandfather, Sons 1 and 2 and Grandson 1 are all members of the coparcenary and hence have the right to inherit a fourth of the ancentral property each. In addition, Grandson 1 has the right to inherit a third of Son 1's share (since this constitutes Son 1's "notional" portion of joint family property to which he, his son and his daughter have equal right of inheritance). This amounts to an additional one-twelfth of the ancestral property for Grandson 1, bringing his total inheritance to one-third of the ancestral property. Granddaughter 1, on the other hand, only inherits a third of Son 1's "notional" share and is left with only one-twelfth of the ancestral property.

Hence, it is apparent that the daughters suffers from discrimination in terms of inheritance.

[8]In case of a Hindu woman dying intestate, all her property devolves equally upon her sons and daughters and husband, if alive. If she has no children or other heirs with first right to her property, then the property devolution takes place according to the source of acquisition.

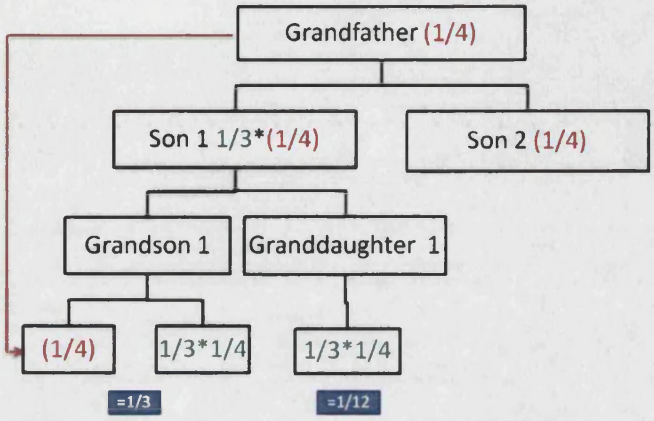

Figure 1.2: Inheritance

The reason why such gender inequality in inheritance rights becomes an important issue is due to the potential threat of disinheritance that daughters may be exposed to as a result. E.g., if a father renounced his rights in the coparcenary property or converted his separate or self-acquired property into coparcenary property, his daughters would be unjustly penalized, but not his sons. Similarly, after partition of the coparcenary, if the father made a gift of or willed his share in the coparcenary to his sons, the rights of his female inheritors would again be defeated. Moreover, for the millions living in rural India, the most common form of property is land that is typically family-owned, which makes the gender bias in inheritance rights quite a significant phenomenon. Thus the law, by excluding the daughter from participating in the coparcenery ownership of ancestral property, not only discriminated against her on grounds of gender, but also led to a negation of her fundamental right of equality as guaranteed to her by the Indian Constitution (Ramanujam, 2005).

1.2.2 State Amendments to the Hindu Succession Act

The topic of inheritance in India is a "concurrent" one, i.e. one over which both the central and the state governments have the right to amend. Thus, some of the states have subsequently been able to enact legislation to amend the Act. In particular, Kerala amended in 1976, Andhra Pradesh in 1986, Tamil Nadu in 1989, Maharashtra and Karnataka in 1994, following which daughters were granted *independent* inheritance rights and the right to a share by survivorship in joint family property, equal with their brothers, but only

if they were unmarried at the time of the reform.[9] Such a reform opened up the entry of women into what had till now been an exclusively male preserve. Joint coparcenary for women now meant that their shares in ancestral property would be held intact even if they were disinherited from their father's own property in his will.[10] These amendments thus sought to, at least partially, redress the concern of gender bias inherent in the original Central law, albeit locally, and I exploit these amendments as a form of "natural experiment" to study the impact of female inheritance rights on female education in India.

However, just because a law is amended does not necessarily imply that it will be well-enforced, as is evident from the continued prevalence of dowry in India despite its official abolition in 1961. Hence, it is important to examine the extent to which the inheritance rights reform was implemented in the reforming states and whether it actually had any discernible effect on women's share of inheritance. Indeed, Rosenblum (2008) finds that in the reforming states, the proportion of women who inherited property increased from 3.5% to 9.1% following the reform. Moreover, restricting the analysis to women who were married after the reform or unmarried, the effect is observed to be larger, going from 1.4% before the reform to 13.5% afterwards.

1.3 Data and Identification Strategy

1.3.1 Data

To measure the impact of the inheritance rights reform on female education, I use data from multiple rounds of the National Family Health Survey of India (NFHS) conducted in 1992, 1998 and 2005.[11] The NFHS is designed along the lines of the Demographic and Health Surveys (DHS) that have been conducted in many developing countries around the world, and are repeated cross-sections.

[9]Kerala passed a slightly different amendment in the form of the Kerala Joint Hindu Family System (Abolition) Act that recognized all family members with an interest in the undivided family estate as being independent full owners of their shares from then onwards. But since the spirit of the amendment was in the same direction and could be expected to favourably affect the inheritance of the daughter, I club them together.

[10]This was primarily due to the fact that the father has testamentary rights, i.e. right to make alterations via will, to only his separate and "notional" share of joint family property, but no right to infringe on the the share of other members of the coparcenary, which post reform included his daughters as well.

[11]The NFHS is carried out by the Ministry of Health and Family Welfare, Government of India.

The NFHS surveys, which are representative at the state level and have an overall response rate of 98 percent, contain detailed information, including educational attainment, on ever-married women in India aged between 15 and 49 years. 29 states of India are covered in the sample.[12] However, the Hindu Succession Act (1956) did not apply to Jammu and Kashmir (Agarwal 1994). Hence I drop that state in my analysis and are left with 28 states.

I focus on women who are wives of the head of the household and who were at least 28 years of age at the time of survey (the latter ensures that women in the sample have completed their education). There are 120,991 such women in my sample, with year of birth spanning 1943 to 1978.[13] Summary statistics are presented for this sample in Table 1.1, Panel A. Average level of education of these women is 3.79 years of completed education (6 years of education correspond to completion of primary school), while average age at marriage is 17.57 years.

To measure the impact of the reform on dowry payments, I use the Rural Economic and Demographic Survey 1999 (REDS) collected by the National Council of Applied Economic Research (NCAER) in India.[14] The dataset, also representative at the state level, covers around 7,500 households from 250 villages in 16 major states of India.[15] Usually household survey data only contain marriage information on current household members. However, the REDS dataset is unique in that it contains retrospective information on marriages, including information on daughters who have married and left the household. Here, I focus on women who were daughters of the head of the household and at least 28 years of age at the time of survey. Also, I restrict

[12]The 3 newest states of India, i.e. Chattisgarh, Uttarakhand and Jharkhand, were created in 2000, out of Madhya Pradesh, Uttar Pradesh and Bihar respectively. They are part of the NFHS wave of 2005, but not of the waves of 1992 and 1998. Addtionally, Sikkim is not a part of the 1992 wave. Smaller Union Territories like Lakshadweep, Andaman and Nicobar Islands, Pondicherry etc. are also excluded.

[13]Of the total 120,991 women, 37,514 obtain from the 1992 round, 39,362 from the 1998 survey and 44,115 from the 2005 survey. Chances of double counting of individuals in successive surveys are very small since NFHS follows a two-stage cluster sampling, whereby it first samples clusters with probability proportional to population size (PPS) sampling, and then it samples households in each cluster using random sampling (IIPS, 2007). The likelihood that the same cluster is sampled is not very high. Even if the sample cluster chosen in one wave is sampled again in the next, exactly the same household is unlikely to be interviewed again as there could be upto 500 households in a single cluster out of which 20-30 are typically sampled (IIPS, 2007).

[14]NFHS do not collect information on the amount of dowry payments made at the time of marriage for the women in its sample.

[15]States excluded are Arunachal Pradesh, Chattisgarh, Goa, Jharkhand, Manipur, Meghalaya, Mizoram, Nagaland, New Delhi, Sikkim and Tripura.

Table 1.1: Descriptive Statistics

	Mean
Panel A: NFHS	
Years of education (Whole sample)	3.79
Years of education (Reforming States)	4.69
Years of education (Non-Reforming States)	3.48
Female Age at Marriage (Whole sample)	17.57
Female Age at Marriage (Reforming States)	17.58
Female Age at Marriage (Non-Reforming States)	17.56
Panel B: REDS	
Dowry payments (Whole sample)	3692.12
Dowry payments (Reforming States)	5773.66
Dowry payments (Non-Reforming States)	2906.45

Notes: * denotes significant at 10%, ** denotes significant at 5%, *** denotes significant at 1%. Panel A contains descriptive statistics from NFHS dataset for women who are wives of the head of the household and 28 years or older at the time of the survey. Panel B contains descriptive statistics from REDS dataset for Hindu women who are daughters of the head of the household and 28 years or older at the time of survey. Dowry payments are deflated using 1966 prices.

the sample to Hindu, Buddhist, Sikh and Jain women (i.e. those who were governed by the original inheritance law HSA 1956 and thereby were affected by the reform), since more than 90% women my sample belong to these religions. This gives me a sample size of 3193 women. Summary statistics for this sample is presented in Table 1.1, Panel B. Average dowry payment made at the time of marriage for these women is Rs. 3692.12 at 1966 prices.

Both the NFHS as well as the REDS datasets ask which year the woman was born as well as in which state she resides (relationship between state of residence and state of birth is examined below), which allows me to construct groups of women with varying degrees of exposure to the reform depending on their year of birth and state of residence. For my analysis, I collapse the datasets by state and year of birth to obtain a state-cohort panel, and present cohort-level results.

1.3.2 Identification Strategy

The identification strategy used in this chapter exploits the fact that exposure to the inheritance rights reform was jointly determined by a woman's state of birth and her year of birth. Not only did a woman have to be born in a state that passed the reform, she also had to be of school-going age when the reform was passed in her state for it to have any impact on her schooling decision. Given that my dataset is a repeated cross-section, this approach amounts to

a difference-in-difference (D-I-D) strategy over cohorts and geographical areas i.e. states.

The NFHS dataset does not contain information on an individual's state of birth but it does collect data on state of residence. Hence my empirical analysis uses state of residence instead of state of birth. If this gives rise to measurement error then my estimates of the effect of greater inheritance rights on female education would suffer from attenuation bias. A second concern that arises in this regard is the possibility of systematic variation in migration behaviour in response to the reform. If gender progressive parents marry their daughters to grooms in the reforming states to take advantage of the favourable laws, then too the estimates would be biased. However, according to the 2001 Census of India, overall inter-state migration in India is quite low at 4.1 percent of the population. Additionally, Rosenzweig and Stark (1989) point out that in their sample of ICRISAT villages, the mean distance between a woman's original residence place and marital place of residence was 30 kilometers, which belies the concern of cross-state movement for the purpose of marriage. Hence the possibility of systematic migration across states seems relatively remote in this particular context.

The empirical analysis, as mentioned above, tests for effect of the reform on "treated" age cohorts. I define the "treated" group as cohorts of women who were of primary school-going age when the reform was passed in their state. In India, children normally attend primary school between the ages of 5 and 10, middle school between the ages of 11 and 13 and high or secondary school between ages of 14 and 15. Hence, my "treated" group consists of cohorts of women who were 10 years or younger at the time of the reform since they were "young" enough for the reform to affect their education choices. The control group, on the other hand, would consist of all the women who were already out of school by the time the reform was passed in their state, i.e. were 21 years or older. The reform ought to have no effect on their educational achievement. Thus, the identification strategy is a difference in difference between the "treated" or "younger" cohorts and the "control" or "older" cohorts, for reforming and non-reforming states.

The basic idea behind the identification strategy is illustrated in Table 1.2 using a simple two-by-two table for one of the reforming states, Kerala. Kerala reformed in 1976. In panel A, I compare the mean educational attainment of women who were fully exposed to the reform (they were 5 years or younger in 1976 i.e. born after 1971) to that of women who were never exposed to the

reform (they were 21 or older in 1976 i.e. born before 1955), in Kerala and the rest of India.[16]

Table 1.2: Means of Education by Cohort: Kerala vs Rest of India

Panel A: Experiment of interest			
	Kerala	ROI	Difference
	(1)	(2)	(3)
Aged 5 or less in 1976	9.37	4.28	5.09
	(0.22)	(0.12)	(0.63)
Aged 21 or more in 1976	5.70	2.55	3.15
	(0.19)	(0.10)	(0.49)
Difference	3.67	1.73	1.94
	(0.30)	(0.16)	(0.79)
Panel B: Control Experiment			
	Kerala	ROI	Difference
	(1)	(2)	(3)
Aged 16 to 20 in 1976	6.10	3.43	2.67
	(0.63)	(0.17)	(0.87)
Aged 21 or more in 1976	5.70	2.55	3.15
	(0.19)	(0.10)	(0.49)
Difference	0.40	0.88	-0.48
	(0.49)	(0.19)	(0.94)

Notes: Kerala reformed in 1976. ROI denotes Rest of Indian states. These do not include the other reforming states i.e. Andhra Pradesh, Tamil Nadu, Maharashtra and Karnataka.

For both cohort groups, Kerala does better than the rest of India. This is not surprising as Kerala is well-known for its achievements in the domain of female education (Sen, 1990). What is interesting is that in both regions, average female educational attainment increased over time (cohorts), but it increased significantly more in the reforming state compared to the non-reforming ones. The difference in these differences may be interpreted as the causal impact of the reform in Kerala, under the assumption that in the absence of the reform, the increase in educational attainment of women would not have differed systematically between Kerala and rest of the Indian states.

However, the identification assumption should not be taken for granted. What if the pattern of increase in female education varied systematically between Kerala and the rest of India? To address this concern, I test for an implication of the identifying assumption where I compare mean educational attainment of women who were between 16 to 20 years old in 1976 to that of women who were 21 or older at that time (control group). Since the former group would have also been out of primary school by the time the reform was

[16]Rest of India does not include the other reforming states, i.e. Andhra Pradesh, Tamil Nadu, Maharashtra and Karnataka.

passed in Kerala, the change in educational attainment between cohorts in this age-group should not, therefore, vary systematically across states, in comparison to the control group. I present the result of this "control" experiment in Table 1.2, Panel B. The estimated difference in differences is close to zero and insignificant.

This strategy is now elaborated to exploit the variation from all the reforming states, whereby I estimate the following equation:

$$e_{sk} = \alpha_s + \beta_k + \gamma_s k + \delta_1 D_{s,(k \geq k'-5)} + \delta_2 D_{s,(k'-10 \leq k \leq k'-6)} + \delta_3 D_{s,(k'-15 \leq k \leq k'-11)} + \delta_4 D_{s,(k'-20 \leq k \leq k'-16)} + \epsilon_{sk} \quad (1.1)$$

The dependent variable e_{sk} denotes the mean years of education of women in state s belonging to cohort k (i.e. born in year k). Let the reform be passed in year k' in state s. Then $D_{s,(k \geq k'-5)}$ is a dummy indicating whether the women belonging to cohort k were 5 years old or younger when the reform was passed in their state. Similarly, $D_{s,(k'-10 \leq k \leq k'-6)}$ is a dummy indicating whether they were between 6 and 10 years old, $D_{s,(k'-15 \leq k \leq k'-11)}$ indicating whether they were between 11 and 15 years old and $D_{s,(k'-20 \leq k \leq k'-16)}$ indicating whether they were between 16 and 20 years old respectively. As mentioned earlier, the group consisting of cohorts of women who were 21 years or older at the time of the reform constitute the omitted category. α_s is a state fixed effect, β_k is a cohort of birth fixed effect, while $\gamma_s k$ captures state-specific trends over cohorts. ϵ_{isk} is the error term. To address serial correlation concerns and to allow for heteroscedasticity, the standard errors are clustered at the state level (Bertrand, Duflo, and Mullainathan, 2004). All regressions are weighted by state-cohort cell size.

The coefficients of interest are δ_1 and δ_2, which capture the effect of being exposed to improved inheritance rights on the "young" cohorts. The hypothesis is that $\delta_1 > 0$ and $\delta_2 > 0$, i.e. when inheritance rights improved following the reform, female education increased. δ_3 and δ_4, on the other hand, capture the effect of the reform on the "older" cohorts. The oldest cohort (16 to 20 years) is specifically included as a falsification test (akin to the "control" experiment described above for Kerala) - the members of this cohort would have left school by the time the reform was passed in their state and hence should not experience any effect on their educational attainment.

Before proceeding to the results, I would like to point out the contribution of each reforming state to the cohort categories constructed above, provided

in Table 1.A.3. Since I focus on women who were 28 or older at the time of survey, the youngest cohort of women were born in 1978 (coming from the 2005 sample).[17] Hence, all the variation in $D_{s,(k \geq k'-5)}$ comes from Kerala while both Andhra Pradesh and Karnataka also contribute to the variation in $D_{s,(k'-10 \leq k \leq k'-6)}$. The variation in $D_{s,(k'-15 \leq k \leq k'-11)}$ comes from Kerala, Andhra Pradesh and Tamil Nadu, while all five reforming states contribute to the variation in the older cohort categories. It is interesting to note that due to the way in which the sample is constructed, the last two states to reform, i.e. Maharashtra and Karnataka, do not contribute to the "treatment" categories since women belonging to these states in my sample were already 16 or older when the reform was passed.[18]

1.4 Effect on Female Education

1.4.1 Basic Results

This section quantifies the impact of improved female inheritance rights, brought about by the reform, on female education. The results from estimating equation 1.1 are reported in Table 1.3. Without controlling for any fixed effects or linear trends, all the cohort groups appear to have benefited from the reform (column 1). However, once state fixed effects, cohort of birth fixed effects and state-specific linear trends over cohort are controlled for, the picture that emerges is more consistent with our expectation (column 3). Exposure to the reform increases mean educational attainment of the youngest cohort by 1.3 years (representing a 24 percent rise) and that of the cohort aged 6 to 10 by 1.12 years (19 percent rise).

Interestingly, the relatively older cohort of women who were 11 to 15 years old when the reform was passed in their state also seems to benefit from the reform - their mean education rises by almost 0.5 years, an increase of around 11 percent. There could be two potential explanations for such an effect: firstly, in India, age categories for schooling levels are often not very strict, such

[17] A small proportion of interviews in the 2005 wave were carried out in 2006, hence the youngest cohort is that of 1978 rather than 1977.

[18] I check for robustness of the results reported later in the chapter to the exclusion of Kerala and find that the effect on women aged 6-10, 11-15 and 16-20 at the time of reform continue to hold, although the magnitude of the coefficients are somewhat smaller. As expected, I can no longer identify the impact for the group of women aged 5 or less at the time of reform. This allays somewhat the potential concern that a "Kerala" effect may be driving the results.

that it is not very uncommon to find older children studying with younger ones for a given grade. Thus, although children are supposed to complete primary schooling by the time they are 10 years old, many would actually complete at a somewhat older age. Moreover, students who fail their class would typically complete primary education at an older age too, and given that quality of schooling in many primary schools (especially public ones) is quite poor (Duflo, Hanna, and Ryan, 2008), failure may be common. Hence the cohort of women aged 11 to 15 at the time of the reform may have been able to benefit from it because they were were probably still enrolled in primary school. Secondly, these results are also consistent with the explanation that the effect of the reform continued into secondary school for these women. Girls who had dropped out after completing primary school may have re-enrolled in secondary school once the incentives for education changed with the inheritance rights reform. 22% of women in my sample have some secondary education.

Table 1.3: Effect on Female Education

	Years of education		
	(1)	(2)	(3)
Aged 5 or less at time of reform	5.59***	1.62***	1.34***
	(0.30)	(0.20)	(0.34)
Aged 6 to 10 at time of reform	3.25**	1.33***	1.12***
	(1.27)	(0.22)	(0.29)
Aged 11 to 15 at time of reform	2.59***	0.74***	0.49***
	(0.72)	(0.18)	(0.13)
Aged 16 to 20 at time of reform	1.68**	0.20*	0.05
	(0.61)	(0.11)	(0.06)
State FE	NO	YES	YES
Cohort of birth FE	NO	YES	YES
State cohort trend	NO	NO	YES
Adj. R-sq	0.13	0.76	0.78
No. of observations	2276	2276	2276

Notes: Standard errors, clustered at state level, are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%. The omitted category is cohorts of women aged 21 years or more at the time of reform. Data is collapsed by state and woman's year of birth. All regressions are weighted by cell sizes.

Thus, overall results seem to suggest that the effect of the reform on female education increased with the extent of exposure to the new set of inheritance laws. However, the "oldest" group of cohorts aged 16 to 20 at the time of the reform did not benefit from it, as expected. Not only is the coefficient for this group insignificant but the magnitude is also quite small. This falsification exercise thus increases our confidence in the validity of the identification strategy and the results.

1.4.2 Cohort-by-Cohort Analysis

Next, I generalize the identification strategy used so far to obtain a more disaggregated picture of the effect of the inheritance rights reform on female education by each cohort.

Consider the following relationship between the mean education (e_{sk}) of a cohort of women in state s and born in year k, and their exposure to the reform:

$$e_{sk} = \alpha_s + \beta_k + \gamma_s k + \sum_{j=0}^{20} D_{sj} \cdot \delta_j + \epsilon_{sk} \tag{1.2}$$

where D_{sj} is a dummy that indicates whether the cohort of women in state s is of age j at the time the reform was passed in her state (a year-of-birth dummy). Cohorts of women aged 21 and above at the time of the reform form the control group, and this dummy is omitted from the regression. Each coefficient δ_j can be interpreted as an estimate of the impact of the reform on a given cohort. This is a generalization of equation 1.1 to estimate cohort-by-cohort effects.

A reasonable testable restriction on the pattern of the coefficients δ_j maybe obtained as follows. Since women aged 16 and older at the time of the reform should not benefit from the reform, the coefficients δ_j should be 0 for $j \geq 16$ and positive and increasing for $j \leq 10$.[19]

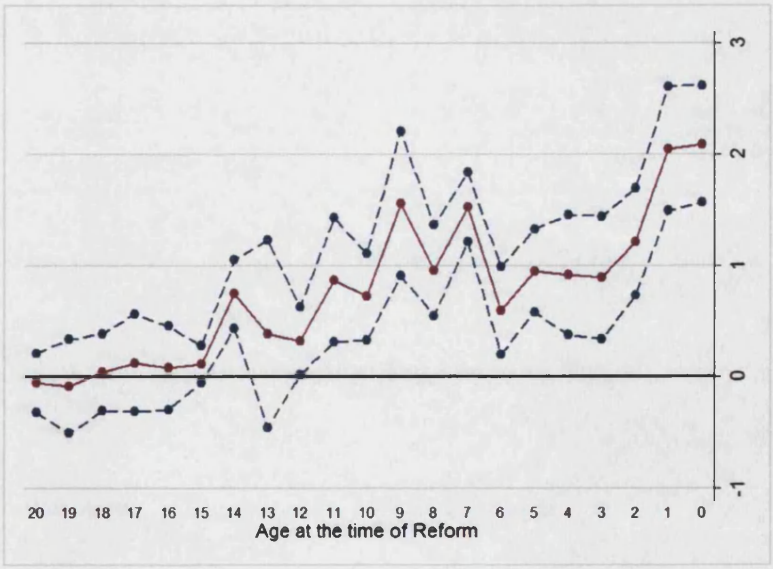

Figure 1.3: Coefficients of Age at Time of Reform in the Education Equation

[19]Strictly speaking, this would be the oldest age at which a woman could have been exposed to the reform (i.e. be of primary school-going age) and still benefit from it.

Figure 1.3 plots the δ_j from the above equation 1.2. Each dot on the solid line is the coefficient of a dummy for being a given age at the time the reform was passed, with 95-percent confidence intervals indicated by the broken lines. These δ_js fluctuate around 0 until age 15 and then start increasing from age 14. As expected, the reform had no effect on the education of the oldest cohorts, but it had a positive effect on the education of the younger cohorts. All coefficients are significantly different from 0 from age 12.

The results from estimating equation 1.2 are also reported in Table 1.A.1. Controlling for state and cohort fixed effects and state cohort trends (column 3), I find that the coefficients are all positive and significantly different from 0 from age 12 and generally increase with year of birth (decrease with age) except for a high value at ages 5, 7 and 9, a decline between ages 9 and 8, and 7 and 6.

The estimates in column (3) suggest that exposure to the improved inheritance rights increases the mean educational attainment of the very youngest cohort i.e. that born in the year of the reform by 2.09 years, which represents a 34 percent increase for this group.

1.4.3 Robustness Checks

1.4.3.1 Hindus vs Non-Hindus

Next, I conduct two robustness checks of the empirical results obtained above. The first exploits the religious differences among these women. As mentioned earlier, the original Hindu Succession Act (1956) only applied to people belonging to certain specific religious communities i.e. the Hindus, Buddhists, Sikhs and Jains. Muslims, Christians, Jews and Parsis constitute the remaining major religious groups who are governed by their own set of personal laws in matters of inheritance. Hence, I estimate the effect of the reform on these two groups of women separately: the "Hindus" (including Buddhists, Sikhs and Jains) and the "non-Hindus" (Muslims, Christians, Jews and Parsis).

The results are reported in Table 1.4. Column 1 replicates the results from column 3 in Table 1.3. However, there are missing observations on religion in NFHS. Thus column 2 of Table 1.4 runs the same regression as in column 1 but only for the sample with non-missing observations on religion in order to check for the existence of any sample bias. The results in column 2 are very similar to those in column 1. Column 3 then looks at the effect of the reform on Hindu women, and finds similar effects compared to the full sample. In

fact, the magnitude of the coefficient is larger for the Hindu women compared to the full sample. Column 4, on the other hand, reports the results for the non-Hindu women. As expected, no significant effect of the reform is observed for this group. The coefficients are also quite small, and even negative for the "older" cohorts.

Table 1.4: Effect on Female Education: Hindus vs Non-Hindus

	Years of education			
	All	All	Hindu	Non-Hindu
	Full Sample	Sample with Religion		
	(1)	(2)	(3)	(4)
Aged 5 or less at time of reform	1.34***	1.38***	1.56***	0.34
	(0.34)	(0.34)	(0.48)	(0.48)
Aged 6 to 10 at time of reform	1.12***	1.13***	0.99*	0.81
	(0.29)	(0.29)	(0.50)	(0.51)
Aged 11 to 15 at time of reform	0.49***	0.51***	0.57***	-0.14
	(0.13)	(0.13)	(0.17)	(0.23)
Aged 16 to 20 at time of reform	0.05	0.06	0.07	-0.14
	(0.06)	(0.07)	(0.08)	(0.13)
State FE	YES	YES	YES	YES
Cohort of birth FE	YES	YES	YES	YES
State cohort trend	YES	YES	YES	YES
Adj. R-sq	0.77	0.80	0.91	0.87
No. of observations	2276	1847	931	916

Notes: Standard errors, clustered at state level, are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%. The omitted category is cohorts of women aged 21 years or more at the time of reform. Missing observations on religion account for differences in sample sizes of column 1 and 2, where column 1 includes the full sample while column 2 includes the sample with non-missing religion observations. Hindu denotes Hindus, Buddhists, Sikhs and Jains while Non-Hindus denote Muslims, Christians, Parsis and Jews. Data is collapsed by state, woman's year of birth and Hindu. All regressions are weighted by cell sizes.

Such a result allows me to rule out the existence of any common trend in female education across religions. This also addresses to some extent the concern that the inheritance rights reform could be part of a larger package of reforms that could be correlated with female education and hence yield biased estimates. If this was true, one should observe the effect on non-Hindu women as well, unless these packages were differentially targeted at Hindu women only. There is, however, little evidence of policies being targeted solely at the Hindus.[20] Admittedly, there could still remain a possibility of the existence of

[20]This may be primarily due to the fact that it may prove challenging to enact policies that benefit the majority Hindu population while ignoring the minority non-Hindu, and in this case, disadvantaged population as it contradicts the ideals of secularity and equality laid down in the Indian constitution. In fact, even a proposal of introduction of oriental education relating to the history of Hinduism met with fierce opposition at the National Parliament in New Delhi a few years back on grounds of being non-secular (Upadhyay,

non-policy oriented differential trends across Hindus and non-Hindus that is not address by this analysis.

1.4.3.2 Including Household Controls

The second robustness check involves controlling for household level covariates of female education. However, the NFHS dataset does not contain information on the parents of the sample of women that were used in the above results. Therefore, I focus on the daughters of these women, belonging to the same household. Since NFHS collects detailed information on the heads of household, this provides me with detailed data on various household level and parental characteristics relating to these daughters which I can then use as controls in the education regression. In this case, I restrict my sample to daughters who were 18 years or older at the time of survey (to ensure completion of education by these women) and present cohort-level results.[21]

The results for female education, after including household level controls, are reported in Table 1.5. Controlling for state and year of birth fixed effects as well as state linear trends, I find that the effect of the reform on the younger cohorts of daughters to be similar in sign to those obtained for the mothers in the Table 1.3 for the sample with non-missing observations on religion (column 4), although the magnitudes of the effects are somewhat smaller. The coefficients for the Hindu sample are much closer in magnitude and significance to those obtained for the sample of mothers (column 5). There is no significant effect on either of the older cohort groups throughout. Thus, it appears that the effect of the inheritance rights reform on female education are robust to controlling for household level determinants of female education. It is also reassuring to note that the coefficients on the household characteristics have the expected signs, and that these are mostly similar for Hindus and non-Hindus, while the reform effect is different across these two groups.

2001).

[21]Table 1.A.4 in the appendix shows the contribution of each reforming state to the variation in exposure to reform in this sample of daughters. Kerala, Andhra Pradesh and Tamil Nadu contribute to the variation in $D_{s,(k \geq k'-5)}$ while all 5 reforming states contribute to the variation in the older cohort groups.

Table 1.5: Effect of on Female Education: With HH Controls

	Years of education					
	All	All	All	All	Hindu	Non-Hindu
	Full Sample	Full Sample	Full Sample	Sample with Religion		
	(1)	(2)	(3)	(4)	(5)	(6)
Aged 5 or less at time of reform	2.33***	1.47***	0.69***	1.00**	1.50***	-0.64
	(0.40)	(0.24)	(0.20)	(0.42)	(0.41)	(1.60)
Aged 6 to 10 at time of reform	1.10**	1.02***	0.62***	0.87***	1.11***	-0.52
	(0.46)	(0.19)	(0.15)	(0.29)	(0.35)	(1.19)
Aged 11 to 15 at time of reform	0.38	0.49***	0.19	0.30*	0.32	-0.12
	(0.41)	(0.17)	(0.14)	(0.18)	(0.32)	(0.57)
Aged 16 to 20 at time of reform	0.00	0.22	0.03	0.10	0.07	-0.09
	(0.34)	(0.14)	(0.15)	(0.21)	(0.25)	(0.46)
Father's education	0.52***	0.39***	0.39***	0.37***	0.28***	0.32***
	(0.07)	(0.03)	(0.04)	(0.03)	(0.03)	(0.05)
Father's age	0.02	0.04***	0.04***	0.00	-0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
HH wealth	0.40***	0.47***	0.50***	0.48***	0.44***	0.66***
	(0.09)	(0.07)	(0.06)	(0.06)	(0.08)	(0.09)
Owns land	-0.49	0.33	0.45	0.52	0.33	0.13
	(1.00)	(0.39)	(0.39)	(0.44)	(0.31)	(0.55)
No. of HH members	-0.53***	-0.14***	-0.15***	-0.19***	-0.03	-0.12*
	(0.10)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)
Urban	0.80	1.47***	1.56***	1.31***	1.81***	0.89
	(0.70)	(0.36)	(0.36)	(0.41)	(0.38)	(0.70)
State FE	NO	YES	YES	YES	YES	YES
Cohort of birth FE	NO	YES	YES	YES	YES	YES
State cohort trend	NO	NO	YES	YES	YES	YES
Adj. R-sq	0.57	0.81	0.81	0.80	0.86	0.75
No. of observations	1744	1744	1744	1056	619	437

Notes: Standard errors, clustered at state level, are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%. The omitted category is cohorts of women aged 21 years or more at the time of reform. Missing observations account for differences in sample size between columns 3 and 4. Column 3 includes the full sample while column 4 includes the sample with non-missing religion observations. The HH wealth variable is an index constructed on the basis of ownership of 13 household assets i.e. type of house, tv, radio, fridge, bicycle, motorcycle, car, sewing machine, clock, sofa, fan, vcr and electricity. Data is collapsed by state, woman's year of birth and Hindu. All regressions are weighted by cell sizes.

1.5 Effect on Dowry Payments

So far, I provide evidence that being exposed to the inheritance rights reform was associated with an increase in female educational attainment. But what explains this effect? I attempt to shed some light on the underlying mechanism of this observed effect in this section.

There could be two potential channels through which female inheritance rights may affect female education - a dowry channel and a complementarity channel.

Dowry payment is most commonly understood as a "groomprice", i.e. the price that a bride's family has to pay to secure a "desirable" match for their daughter, conditional on her attributes. Greater female inheritance rights may increase the relative "attractiveness" of women in the marriage market and substitute for other dimensions of bridal value i.e. social status, beauty etc. In the presence of strong preference for brides with inheritance, competition among grooms may lower dowry payments demanded from such brides.[22] This relaxes the bridal household's budget constraint and, under the assumption that parents want to send their daughters to school and are only prevented by their budget constraint, an expansion of female inheritance rights may stimulate greater investment in the education of daughters. This constitutes the dowry channel, where the effect of the reform on female education goes through dowries.

Alternatively, an increase in female inheritance rights may provide parents with direct incentives to invest more in the education of their daughters, due to the existence of complementarity between education and female inheritance rights in relation to able management of household property, that directly affects their future household income. The hypothesis is that parents invest in the human capital of their children with an eye towards not only the returns that will accrue to their offspring, but also their own future returns arising from such investment. Specifically, I refer to the expected transfers that will accrue to retired parents from their children, which will be a function of the latter's human capital investment. In patriarchal and virilocal[23] societies, sons

[22] An alternative viewpoint considers dowry as a form of "pre-mortem" bequest given to the daughter at the time of her marriage since patrilineal norms of inheritance stipulate that only sons can inherit family property. The new reform, by directly endowing women with full right of inheritance, makes dowry less salient, such that one should observe a reduction in dowry payments made at the time of a daughter's marriage.

[23] Virilocality is a social norm that prescribes that daughters move away from their natal (parental) families upon marriage, to reside with the husband's family.

are typically expected to take in and care for parents in old age (Levine and Kevane, 2003; Yueh, 2001). Thus, investment in sons' education enhances their future productivity and income which, in turn, determines the amount of expected transfers parents may obtain from them in future. Daughters, on the other hand, are traditionally expected to marry and migrate to their husband's household, such that the returns from the investment in their human capital do not accrue to their natal (parental) families. Thus there is less incentive to educate daughters. However, with the introduction of greater female inheritance rights to family property, parents are now able to enjoy a return on their daughters' education in the form of better property maintenance, given the acknowledged complementarity between education levels and economic activity (Foster and Rosenzweig, 1996; Rud, 2009), that in turn would translate into greater future household income for the parents. This generates incentives for parents to invest more in their daughters' education. This constitutes the complementarity channel, where the reform directly affects female education, and the impact on dowries is derived therefrom.

Now, school-leaving age for children in India is 15 while the mean age at marriage of women in my sample is 17 (some even marry at 16). Owing to such a short gap between the age at which a girl leaves school and the age at which she marries, education and dowry payments are jointly determined for most women in my sample. In other words, it is challenging to identify whether lower dowries following exposure to the reform led to an increase in education of these women (dowry channel) or higher education following exposure to the reform led to reduction in their dowries at the time of marriage (complementarity channel).

However, for a subset of these women i.e. for those who were too old to go to school but were of marriageable age (16-20) at the time of the reform, these two effects can be separated. This is because the complementarity channel is not applicable for this group of women. In other words, if dowries are found to fall for these women, it cannot be due to an increase in education following exposure to the reform, since these women were too old to go to school at the time the reform was passed. Dowries could only fall for this group if the reform directly led to a reduction in dowry, in line with the argument of the dowry channel presented above. In other words, if the mechanism of the reform works through the dowry channel, then one should observe dowries to fall immediately for the group of women who were of marriageable age (but too old to go to school) at the time of the reform. This is key for the identification

of the underlying mechanism of the reform's effect on female education.

For the analysis of dowries, I use the Rural Economic and Demographic Survey 1999 (REDS), which is representative at the state level. Here, too, I first collapse the dataset by state and woman's year of birth and analyze the impact of the reform on the dowry payments of the eligible cohorts of women by running a similar estimation as equation 1.1 above:

$$d_{sk} = \alpha'_s + \beta'_k + \gamma'_s k + \delta'_1 D_{s,(k \geq k'-5)} + \delta'_2 D_{s,(k'-10 \leq k \leq k'-6)} + \delta'_3 D_{s,(k'-15 \leq k \leq k'-11)} + \delta'_4 D_{s,(k'-20 \leq k \leq k'-16)} + \epsilon'_{sk} \quad (1.3)$$

where d_{sk} denotes mean dowry paid (in rupees) at the time of marriage of women in state s belonging to cohort k. In this case too, all regressions are weighted by state-cohort cell sizes. The coefficients δ'_1, δ'_2 and δ'_3 capture the effect of the reform on the dowry payments of women who were of school-going age at the time of the reform while δ'_4 captures the same on the dowry payments of women who were out of school and of marriageable age at the time of the reform. Testing the hypothesis $\delta'_4 = 0$ allows me to identify the underlying mechanism of the reform's effect.

I restrict my sample to daughters belonging to "Hindu" families, since over 90% of the women in my sample are "Hindus", and who were 28 years or older at the time of survey. The nominal dowry payments in the dataset are converted to real values using the Indian Consumer Price Index (base: 1966 = 100).[24]

The results regarding the dowry effect are shown in Table 1.6. Controlling for state fixed effects, cohort fixed effects and state-specific cohort trends (column 3), I find no significant impact of the reform on mean dowry payments of the 16-20 cohorts i.e. $\delta'_4 = 0$. On the other hand, mean dowry payments for the cohorts aged 5 or less at the time of the reform is lower by 14749 1966 Rupees while that for cohorts aged 6 to 10 is lower by 9381 Rupees, relative to the comparison group. There is no significant effect on the dowry payments of the 11-15 cohort.

This shows that improved female inheritance rights did not reduce dowries for the cohorts of women whose education is not affected by the reform, indicating that the effect goes through education to dowries. This provides some

[24] I use the Consumer Price Index for Agricultural Labourers (available at `www.indiastat.com`) as the deflator since the REDS dataset focuses on a rural sample. Also, over 90 percent of the families in my sample pay dowry and receive nothing, hence I only focus on dowry payments.

Table 1.6: Effect on Real Dowry Payments

	Dowry Payment		
	Hindu	Hindu	Hindu
	(1)	(2)	(3)
Aged 5 or less at time of reform	1806.92***	-5150.07***	-14749.17***
	(508.14)	(1205.82)	(3691.30)
Aged 6 to 10 at time of reform	5806.75***	-1577.39	-9381.85***
	(508.14)	(1220.05)	(3075.21)
Aged 11 to 15 at time of reform	11478.17***	5037.51**	652.08
	(2193.65)	(1811.34)	(2094.03)
Aged 16 to 20 at time of reform	3585.18	590.54	-431.12
	(2502.29)	(1286.35)	(1214.02)
State FE	NO	YES	YES
Cohort of birth FE	NO	YES	YES
State cohort trend	NO	NO	YES
Adj R-sq	0.21	0.50	0.54
No. of observations	328	328	328

Notes: Standard errors, clustered at state level, are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%. The omitted category is cohorts of women aged 21 years or more at the time of reform. The REDS 99 dataset is used in this table. Dowry payments are deflated using 1966 prices. Analysis in this table is restricted to only Hindu women since more than 90% of the women in the sample are Hindus. Data is collapsed by state and woman's year of birth. All regressions are weighted by cell sizes.

suggestive evidence in favour of the complementarity channel in explaining the impact of the inheritance rights reform on female education.

It is, however, important to exercise some caution in this regard. The above results cannot be claimed to provide conclusive proof against the dowry channel if it was the case that knowledge regarding the reform was not well-disseminated immediately after its enactment, which could also potentially lead to the dowry effect on the 16-20 group of women to be muted and insignificant. Moreover, the above approach of identifying the underlying mechanism also assumes that the dowry response to the reform is the same across different cohorts of women. If later cohorts exhibited differential effects on dowry payments following exposure to the reform compared to earlier cohorts, then too the above result cannot be taken as conclusive proof against the dowry channel.

1.5.1 Cohort-by-Cohort Analysis

To obtain a cohort-by-cohort picture of the effect of the reform on real dowry payments, I next consider the following relationship between the mean dowry (d_{sk}) of a cohort of women in state s and born in year k, and their exposure

to the reform:

$$d_{sk} = \alpha'_s + \beta'_k + \gamma'_s k + \sum_{j=0}^{20} D_{sj} \cdot \delta'_j + \epsilon'_{sk} \tag{1.4}$$

Figure 1.4 plots the δ'_j from the above equation 1.4. Each dot in the graph is the coefficient of a dummy for being a given age at the time the reform was passed, with 95-percent confidence intervals indicated by broken lines. These δ'_js fluctuate around 0 until age 17, then increase from 16 to 14, and then decline from 13 onwards. In line with the results obtained earlier, the reform had a strong negative impact on the real dowry payments of the younger cohorts, with the effects being significantly different from 0 from age 12. However, there is a small but significant impact on some of the oldest cohorts, especially those aged 18 and 19. This indicates that probably there was some concomitant benefits of the reform on women who were in the marriage market at the time of the passage of the reform in terms of the dowry they had to pay, but the magnitude of this effect is far smaller than that enjoyed by the younger cohorts.[25]

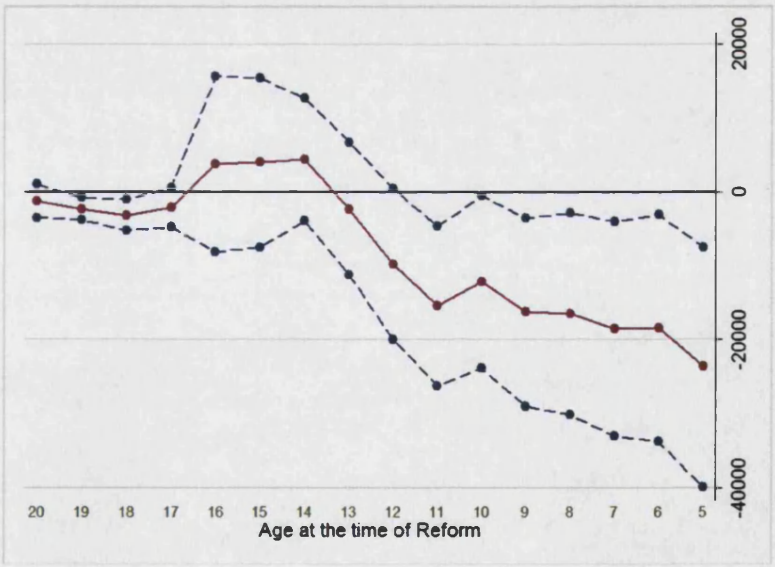

Figure 1.4: Coefficients of Age at Time of Reform in the Dowry Equation

The results from estimating equation 1.4 are also reported in Table 1.A.2 in

[25]It is to be noted that this analysis stops with cohort aged 5 years at the time of reform, since the youngest cohort of women in my sample were born in 1971. Further details on cohort sizes are given in Table 1.A.5 in the Appendix.

the Appendix. Controlling for state and cohort fixed effects and state cohort trends (column 3), I find that the coefficients are all negative and significantly different from 0 from age 12 and generally increase in absolute terms with date of birth (decrease with age) except for a high value at ages 11 and 18 and a decline at 13. Thus the dowry results by cohorts match well with those for education presented in Table 1.A.1, which is reassuring.

The estimates in column (3) of Table 1.A.2 suggest that exposure to the improved inheritance rights reduced the mean real dowry payment of the very youngest cohort by just under than 24,000 1966 Indian Rupees.

1.5.2 Robustness Check

1.5.2.1 Including Household Controls

As a robustness check, I control for household level variables that may be correlated with dowry payments, like caste status, household income etc. The results are reported in Table 1.7.

The impact of the reform, after including household controls, continues to be similar to the results presented in Table 1.6. Among the household level controls, caste is often considered as an important determinant of levels of dowry payment. Hindu Brahmins are the omitted category in this case, and it appears that marriages in lower caste groups typically require higher dowry as compared to the high castes but the effects are not significant.

Having more daughters shrinks the amount of dowry available for each daughter and hence has a negative coefficient, although not significant. Household income seems to have no significant impact on dowry payments. This maybe explained by the fact that caste hierarchy is often strongly correlated with income status and the effect of income on dowry is absorbed in the caste variables.

1.6 Conclusion

Human capital investment is widely considered to be one of the most important drivers of economic growth. This is especially relevant in the case of women as it is well-acknowledged that greater schooling of women enhances the human capital of the next generation and thus make a unique contribution to economic growth (Behrman, Foster, Rosenzweig, and Vashishtha, 1999). This

Table 1.7: Effect on Real Dowry Payments: With HH Controls

	Dowry Payment		
	Hindu	Hindu	Hindu
	(1)	(2)	(3)
Aged 5 or less at time of reform	1176.33	-5576.64***	-14221.73***
	(719.21)	(1075.51)	(4033.90)
Aged 6 to 10 at time of reform	5011.32***	-2087.74*	-9068.24**
	(704.26)	(1046.03)	(3268.79)
Aged 11 to 15 at time of reform	10556.91***	4519.97***	580.44
	(1963.65)	(1498.63)	(2040.27)
Aged 16 to 20 at time of reform	3200.55	464.77	-425.60
	(2730.26)	(1232.11)	(1335.35)
No. of daughters	-587.96	-985.74*	-854.58
	(350.33)	(483.52)	(585.09)
HH income	48.69	54.71	58.41
	(40.59)	(43.10)	(50.11)
Non-Brahmin upper caste	5631.01**	103.20	682.78
	(2088.70)	(1281.12)	(1293.79)
SC	4842.64***	827.82	278.51
	(1269.27)	(1616.84)	(1777.25)
ST	1291.05	2869.71	707.19
	(3253.93)	(4039.88)	(4464.26)
OBC	5085.72*	-542.06	-278.76
	(2588.91)	(1419.04)	(1252.88)
Non-classified Hindus	6200.72*	1965.35	3524.05
	(3198.20)	(2305.68)	(2424.35)
State FE	NO	YES	YES
Cohort of birth FE	NO	YES	YES
State cohort trend	NO	NO	YES
Adj R-sq	0.28	0.53	0.55
No. of observations	319	319	319

Notes: Standard errors, clustered at state level, are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%. The omitted category is cohorts of women aged 21 years or more at the time of reform. The REDS 99 dataset is used in this table. Dowry payments are deflated using 1966 prices. Sample restricted to only Hindu women since more than 90% of the women in the sample are Hindus. Brahmin, non-Brahmin upper caste (UC), scheduled caste (SC), scheduled tribes (ST), other backward castes (OBC) and non-classified (NC) Hindus denote the caste classification of Hindu society. The HH wealth variable is an index constructed on the basis of ownership of 13 household assets i.e. type of house, tv, radio, fridge, bicycle, motorcycle, car, sewing machine, clock, sofa, fan, vcr and electricity. Data is collapsed by state and woman's year of birth. All regressions are weighted by cell sizes.

chapter studies the impact of female property rights, in particular inheritance rights, on the human capital attainment of women by exploiting plausibly exogenous variation generated by an amendment to female inheritance laws in India. Using repeated cross-sectional household survey data, I find that an improvement in the inheritance rights of women led to an increase of 1.1-1.3 years in the mean educational attainment for the cohorts of women who were exposed to the reform.

Regarding the mechanism behind this effect, this chapter argues that there could be two potential channels. Firstly, female inheritance rights may increase the relative "attractiveness" of women in the marriage market and hence lower dowry payments, which relaxes the bridal household's budget constraint and in turn leads to greater investment in the education of women. On the other hand, there could exist a direct complementarity between education and female inheritance rights in an environment where women have a greater interest in family property and its management, recognizing which parents invest more in their daughter's education. Analyzing the impact of exposure to the reform on dowry payments made at marriage, I find suggestive evidence in favour of the complementarity channel. Hence the main contribution of this chapter is to identify the impact of inheritance rights on female education as well as attempt to shed some light on the possible mechanism behind such an effect.

It is important to point out that the estimates obtained in this chapter regarding the effect inheritance rights reform on female education is substantially large. A potential explanation behind this might be that skewed property rights are often looked upon as one of the primary causes behind the general low educational achievement of women in Indian society (Agarwal, 1994). Since property traditionally devolved through sons (patrilineal norms), and social rules stipulated that daughters reside with the husband's family post marriage (patrilocal norms), parents had little incentive to allocate resources for their daughters' education. By amending the inheritance laws to make them more gender equal, this reform changed the fundamental rule of property devolution and hence it should not come as a huge surprise that the impact on female education has also been quite sizeable.

Thus, the results obtained in this chapter have policy implications with regard to how socio-personal laws can affect economic outcomes. To the extent that inequality in opportunity for women can be traced to legal provisions, changes in inheritance legislation have the potential of addressing gender imbalances and influencing a wide range of outcomes for women, with economy-

wide implications.

However, a relevant question to ask in this regard concerns the scalability of such amendments in order to ensure that the benefits can be reaped by a bigger share of the population. Indeed, the amendment to the Hindu Succession Act 1956 as described in this chapter was extended to the whole of India in 2005, and it will be interesting to explore if the benefits enjoyed by the women in the first set of reforming states are subsequently shared by the rest of the country's female population.

1.A Appendix

Table 1.A.1: Effect on Female Education by Cohort

Age at Reform	Years of education		
	(1)	(2)	(3)
0	6.28***	2.52***	2.09***
	(0.30)	(0.23)	(0.27)
1	6.79***	2.50***	2.05***
	(0.30)	(0.27)	(0.29)
2	5.86***	1.63***	1.21***
	(0.30)	(0.25)	(0.24)
3	5.76***	1.27***	0.89***
	(0.30)	(0.24)	(0.28)
4	5.32***	1.27***	0.91***
	(0.30)	(0.22)	(0.27)
5	4.66***	1.31***	0.95***
	(0.30)	(0.16)	(0.19)
6	4.59***	0.95***	0.60***
	(0.30)	(0.18)	(0.20)
7	5.34***	1.87***	1.53***
	(0.30)	(0.19)	(0.16)
8	2.79***	1.22***	0.96***
	(1.00)	(0.19)	(0.21)
9	3.91***	1.85***	1.56***
	(1.28)	(0.37)	(0.33)
10	2.11*	0.98***	0.72***
	(1.22)	(0.23)	(0.20)
11	3.40***	1.21***	0.87***
	(0.53)	(0.29)	(0.28)
12	2.83***	0.63***	0.32**
	(0.67)	(0.16)	(0.15)
13	2.79***	0.69	0.39
	(0.41)	(0.46)	(0.43)
14	3.10***	1.02***	0.75***
	(0.58)	(0.18)	(0.16)
15	1.52	0.35**	0.12
	(1.00)	(0.13)	(0.08)
16	1.84**	0.25	0.08
	(0.79)	(0.19)	(0.19)
17	2.13***	0.31	0.13
	(0.59)	(0.23)	(0.22)
18	1.56***	0.22	0.04
	(0.54)	(0.15)	(0.18)
19	1.74***	0.09	-0.08
	(0.53)	(0.27)	(0.21)
20	1.23*	0.10	-0.05
	(0.72)	(0.19)	(0.14)
State FE	NO	YES	YES
Cohort of birth FE	NO	YES	YES
State cohort trend	NO	NO	YES
Adj R-sq	0.13	0.76	0.78
No. of observations	2276	2276	2276

Table 1.A.2: Effect on Real Dowry Payments by Cohort

Age at Reform	Dowry Payments		
	Hindu	Hindu	Hindu
	(1)	(2)	(3)
5	1806.92***	-4644.20**	-23675.00**
	(517.85)	(1815.19)	(8277.61)
6	5795.93***	-533.17	-18422.07**
	(517.85)	(1863.84)	(7820.69)
7	4991.66***	-1838.09	-18508.95**
	(517.85)	(1846.53)	(7393.32)
8	5124.01***	-1116.65	-16498.68**
	(517.85)	(1808.22)	(6970.13)
9	5148.63***	-1968.66	-16270.56**
	(517.85)	(1856.25)	(6490.02)
10	8449.34***	928.01	-12243.08*
	(517.85)	(1833.92)	(5953.46)
11	3314.52***	-3384.81*	-15429.49**
	(517.85)	(1820.83)	(5511.75)
12	7605.00***	1148.47	-9795.77*
	(517.85)	(1772.50)	(5219.27)
13	14317.77***	7515.94***	-2283.21
	(517.85)	(1755.75)	(4585.03)
14	19732.27***	13063.25***	4372.51
	(517.85)	(1834.29)	(4237.58)
15	13048.13	9076.25	3989.28
	(7829.91)	(6420.94)	(5841.88)
16	11308.57	7716.26	3796.68
	(8562.29)	(6633.35)	(6070.04)
17	2855.95	706.99	-2099.63
	(3682.04)	(1806.26)	(1354.33)
18	1896.41	-1012.28*	-3120.53**
	(1424.88)	(528.91)	(1060.58)
19	2448.30	-501.93	-2283.42***
	(1464.38)	(476.72)	(767.68)
20	2354.82***	36.89	-1245.62
	(707.60)	(673.31)	(1153.02)
State FE	NO	YES	YES
Cohort of birth FE	NO	YES	YES
State cohort trend	NO	NO	YES
Adj R-sq	0.26	0.56	0.63
No. of observations	328	328	328

Notes: Standard errors, clustered at state level, are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%. The omitted category is cohorts of women aged 21 years or more at the time of reform. The REDS 99 dataset is used in this table. Dowry payments are deflated using 1966 prices. Analysis in this table is restricted to only Hindu women since more than 90% of the women in the sample are Hindus. Data is collapsed by state and woman's year of birth. All regression weighted by cell sizes.

Table 1.A.3: Number of Women of a Given Age at the Time of Reform in Reforming States: NFHS

Age at reform	Andhra Pradesh	Karnataka	Kerala	Maharashtra	Tamil Nadu	Total
-2	0	0	28	0	0	28
-1	0	0	47	0	0	47
0	0	0	45	0	0	45
1	0	0	48	0	0	48
2	0	0	65	0	0	65
3	0	0	41	0	0	41
4	0	0	58	0	0	58
5	0	0	107	0	0	107
6	0	0	116	0	0	116
7	0	0	112	0	0	112
8	193	0	123	0	0	316
9	115	0	111	0	0	226
10	233	0	123	0	0	356
11	103	0	159	0	135	397
12	130	0	230	0	125	485
13	116	0	229	0	166	511
14	93	0	180	0	108	381
15	332	0	233	0	140	705
16	286	120	218	136	122	882
17	206	100	226	185	153	870
18	229	152	214	225	313	1,133
19	178	120	210	173	268	949
20	347	126	146	181	297	1,097
21	169	108	186	187	241	891
22	311	113	176	176	199	975
23	276	242	161	351	290	1,320
24	275	207	140	336	229	1,187
25	352	213	135	353	373	1,426
26	285	205	128	289	291	1,198
27	233	196	94	304	306	1,133
28	252	215	96	319	337	1,219
29	283	307	89	367	287	1,333
30	160	303	50	363	298	1,174
31	130	310	61	354	287	1,142
32	145	295	77	358	259	1,134
33	132	275	39	333	174	953
34	148	288	0	334	155	925
35	117	256	0	326	172	871
36	128	235	0	316	160	839
37	65	227	0	292	170	754
38	46	168	0	193	139	546
39	71	163	0	206	173	613
40	37	181	0	180	74	472
41	42	151	0	168	76	437
42	49	125	0	134	80	388
43	50	140	0	151	64	405
44	0	103	0	79	67	249
45	0	57	0	37	48	142
46	0	64	0	67	46	177
47	0	69	0	66	0	135
48	0	59	0	55	0	114
49	0	64	0	43	0	107
50	0	36	0	44	0	80
51	0	9	0	14	0	23
Total	6,317	6,002	4,501	7,695	6,822	31,337

Table 1.A.4: Number of Daughters of a Given Age at the Time of Reform in Reforming States: NFHS

Age at reform	Andhra Pradesh	Karnataka	Kerala	Maharashtra	Tamil Nadu	Total
-12	0	0	88	0	0	88
-11	0	0	68	0	0	68
-10	0	0	89	0	0	89
-9	0	0	63	0	0	63
-8	0	0	62	0	0	62
-7	0	0	43	0	0	43
-6	0	0	47	0	0	47
-5	0	0	178	0	0	178
-4	0	0	133	0	0	133
-3	0	0	139	0	0	139
-2	205	0	108	0	0	313
-1	142	0	109	0	0	251
0	183	0	99	0	0	282
1	112	0	173	0	148	433
2	107	0	290	0	138	535
3	65	0	249	0	131	445
4	55	0	222	0	108	385
5	123	0	215	0	87	425
6	137	206	176	273	83	875
7	97	117	156	228	59	657
8	92	142	133	208	198	773
9	68	70	120	161	136	555
10	76	97	111	170	143	597
11	45	71	77	125	121	439
12	157	59	83	88	106	493
13	105	268	68	313	105	859
14	129	156	61	200	64	610
15	68	199	63	217	230	777
16	59	117	39	143	171	529
17	49	91	41	133	162	476
18	48	107	29	133	117	434
19	65	161	36	174	98	534
20	39	228	21	198	84	570
21	25	171	12	159	67	434
22	26	133	24	94	72	349
23	15	134	21	146	60	376
24	33	92	10	85	33	253
25	15	119	10	77	41	262
26	21	86	8	60	24	199
27	6	61	10	51	41	169
28	7	59	8	41	28	143
29	20	32	9	28	14	103
30	8	51	5	39	11	114
31	3	31	4	23	17	78
32	10	20	2	8	17	57
33	1	27	2	18	6	54
34	17	18	2	8	11	56
35	5	17	2	10	8	42
36	4	11	4	12	8	39
37	3	14	2	7	13	39
38	2	7	4	10	5	28
39	6	6	2	7	3	24
40	0	13	0	7	2	22
41	0	8	3	9	3	23
42	0	8	1	7	3	19
43	0	2	1	6	1	10
44	3	0	0	5	1	9
45	0	3	2	1	2	8
46	2	3	0	3	0	8
47	1	5	0	0	0	6
48	1	2	0	4	0	7
49	3	3	0	2	2	10
50	1	2	0	0	1	4
51	0	0	0	0	1	1
52	0	3	0	1	0	4
53	0	1	1	1	0	3
55	0	3	0	1	0	4
56	0	1	0	2	1	4
57	0	1	0	0	0	1
58	0	0	0	2	0	2
59	1	0	0	0	0	1
63	0	1	1	0	0	2
64	1	0	0	0	0	1
Total	2,466	3,237	3,739	3,698	2,985	16,125

Table 1.A.5: Number of Women of a Given Age at the Time of Reform in Reforming States: REDS 98

Age at reform	Andhra Pradesh	Karnataka	Kerala	Maharashtra	Tamil Nadu	Total
5	0	0	17	0	0	17
6	0	0	10	0	0	10
7	0	0	15	0	0	15
8	0	0	11	0	0	11
9	0	0	10	0	0	10
10	0	0	10	0	0	10
11	0	0	11	0	0	11
12	0	0	6	0	0	6
13	0	0	3	0	0	3
14	0	0	10	0	0	10
15	5	0	9	0	0	14
16	9	0	12	0	0	21
17	8	0	6	0	0	14
18	3	0	8	0	25	36
19	5	0	10	0	23	38
20	4	0	3	0	32	39
21	10	0	13	0	21	44
22	3	0	3	0	24	30
23	4	30	3	29	19	85
24	3	20	6	19	17	65
25	2	29	3	29	22	85
26	6	21	9	18	16	70
27	5	19	1	23	15	63
28	0	19	2	9	13	43
29	1	20	3	18	10	52
30	1	14	2	20	23	60
31	1	13	3	18	8	43
32	3	8	0	14	7	32
33	0	18	0	14	5	37
34	2	10	1	15	6	34
35	0	10	0	10	7	27
36	2	6	1	6	2	17
37	0	4	0	5	1	10
38	0	4	0	8	1	13
39	0	11	0	4	3	18
40	0	3	0	4	4	11
41	1	4	0	1	0	6
42	0	2	0	6	0	8
43	0	2	0	3	2	7
44	0	3	0	2	0	5
45	0	1	0	3	0	4
46	0	0	0	1	0	1
47	0	0	0	3	1	4
48	0	0	0	3	0	3
51	0	0	0	1	0	1
Total	78	271	201	286	307	1,143

Chapter 2

The Intergenerational Impact of Maternal Inheritance Rights on Child Education

2.1 Introduction

Women in developing countries lag behind men in many domains. One such key domain is property rights: in many of these countries women still lack independent rights to own and manage property without their husband's consent (Duflo, 2005). Even in the case of government-led redistributive property rights reforms in such countries, the needs of women have traditionally been overlooked (Deere and Leon, 2001; USAID, 2006).[1]

There are, however, strong arguments in favour of separate property rights for women, not only on the grounds of equity but also that of efficiency. Independent property rights for women have been argued to improve agricultural productivity by enhancing their access to credit that facilitates productive investment in land, especially in the context of male outmigration that is common in many parts of the developing world (Agarwal, 1994). Such rights are also claimed to improve intra-household bargaining power of women that, in turn, is found to be associated with better household outcomes. Thus, improving women's property rights may have far-reaching consequences for growth, distribution and welfare.

[1]One of the reasons cited for such an occurence is the treatment of a household as a unitary entity by communities and the state, whereby property rights are ceded to the male household head in the expectation that all of the family would benefit as a result (Deere and Leon, 2001).

This chapter explores the impact of maternal property inheritance rights on child education. Existing studies find a positive association between mother's access to property and child outcomes (see Agarwal (1994) and Deere and Leon (2001) for a review), but the causal interpretation of these findings is problematic because a woman's access to property may be correlated with unobserved dimensions of her ability or family background that may directly affect child outcomes. To circumvent this problem, this chapter exploits a "natural experiment" in the form of a legal change to female property inheritance rights in India that was differentially enacted across states in order to evaluate the impact of granting greater property inheritance rights to women on the education of their children.

The fundamental law governing present day property inheritance rights for the Hindu majority of India (as well as some "Hindu-like" religions i.e. Buddhists, Sikhs and Jains) is the Hindu Succession Act of 1956 (HSA), which discriminated against female heirs by stipulating that only male descendants of the family could inherit joint family property. However, the HSA was subsequently amended by certain states of India, which granted equal rights of inheritance to ancestral property to both male and female heirs of the family, provided the latter were unmarried at the time of the refom.

I exploit this over-time and across-state variation in legal amendments to identify the causal impact of the property rights reform relating to mothers on the educational attainment of their children. In particular, I use a difference-in-difference strategy that first takes the difference in average years of education between children born to mothers who were young enough to benefit from the reform ("treatment" group) and those born to mothers who were too old to do so ("control" group), and then takes the difference in these differences between reforming and non-reforming states. The identifying assumption here is that there are no time-varying state-specific characteristics correlated with child education and the passage of reform that would generate spurious results.

However, there exists a possibility that some of the children of these "treated" mothers (in particular, girls) may *themselves* be exposed to the reform. The findings in Chapter 1 suggest that these daughters would directly benefit from a higher level of education, owing to the complementarity between female inheritance rights and education in the context of household property management. The present chapter, however, focuses only on the intergenerational impact of the reform on children *through their mothers*, and hence looks at only those children who were all fully exposed to the reform in order to net out the direct

effect of the reform.

Chapter 1 shows that cohorts of women who were exposed to the reform enjoyed not only better property inheritance rights but a higher level of education as well. Hence, the children of the "treated" women are potentially exposed to two effects of their mothers' exposure to the reform on their education: a direct effect derived from their mothers' improved inheritance rights, and an indirect effect operating through their mothers' increased education. I control for the level of education of mothers in an attempt to identify the direct effect of mothers' exposure to the reform on education of children.

Using a household sample obtained from multiple waves of the National Family and Health Survey of India, I find that, even after controlling for the education level of mothers, strengthening of maternal property rights is associated with an average increase of 1.17 years of education (an improvement of 18%) for daughters. However, no significant impact is observed in the case of sons.

With regard to the direct effect of mothers' exposure to the reform on child education (i.e. through mothers' improved inheritance rights), there could be two potential channels. The first is that of improved bargaining position of mothers within their marital household following the expansion of female inheritance rights. It may be argued that women who enjoy independent rights to property, e.g. land, may have a stronger fall-back position outside marriage and therefore greater bargaining power within it vis-á-vis their husbands, compared to women who don't. This may, in turn, be reflected in greater influence of such women in the household decision-making process that translates into stronger representation of their preferences in household resource allocation. In fact, a number of existing studies suggest that when intra-household decisions are made by women, investment in children's education, nutrition and health are greater (Thomas, 1990, 1992; Hoddinott and Haddad, 1995; Pitt and Khandker, 1998). The second channel is that of improved access to credit. Greater maternal inheritance rights may enlarge the asset base of the household, thereby enhancing the size of collateral at its disposal that, in turn, provides greater access to loans to finance children's education.

In an attempt to shed light on the underlying mechanism of the reform's effect on child education, I analyse separately the impact of exposure to the reform on intra-household bargaining power of the mothers as well as on their access to credit. For this purpose, I use the individual sample from the 2005 wave of the National Family and Health Survey of India that explicitly asks

questions relating to the extent of "say" enjoyed by women in the household decision-making process as well as whether or not they have a bank account. I find that women who were exposed to the reform were, on average, significantly more likley to enjoy high bargaining power in the decision-making process of their households compared to those who were not exposed, while no differential effect is observed on the likelihood of owing a bank account for these women. This provides suggestive evidence in favour of the bargaining power hypothesis in explaining the impact of mother's exposure to inheritance rights reform on child education.

This chapter relates to the rich literature on the role of property rights in enhancing investment incentives (Banerjee, Gertler, and Ghatak, 2002; Besley, 1995; Field, 2005; Johnson, McMillan, and Woodruff, 2003) etc. By focusing on the role of property rights on human capital accumulation, within an intergenerational context, this chapter attempts to further our understanding on the salience of property rights in the context of economic development.

This chapter also relates to an extensive literature on the role of women as decison-makers and their impact on household choices. A number of studies use the woman's income contribution to the household budget as a proxy for her decision-making power and find strong associations with child welfare (Thomas, 1990, 1992; Hoddinott and Haddad, 1995). However, to the extent that these results are subject to endogeneity concerns, the use of plausibly exogenous variation created by legal changes to inheritance laws provides a cleaner identification.

The rest of the chapter is organized as follows. The next section recapitulates the key features of the institutional setup of inheritance laws in India. The third section provides details regarding the data and the empirical strategy while the fourth section presents the main results on child education. The fifth section attempts to disentangle the mechanism underlying the estimated effect. The final section concludes.

2.2 The Institutional Background

2.2.1 The Hindu Succession Act, 1956

As mentioned above, the Hindu Succession Act of 1956 (HSA) governs the issue of inheritance of property in India. This Act covers 86% of the Indian population (see Agarwal (1994) p. 211) and applies not only to Hindus but

people belonging to certain other so-called "Hindu-like" religions as well, i.e. the Sikhs, Jains and Buddhists. According to this Act, daughters of a "Hindu" male dying intestate (i.e. without leaving a will) were equal heirs, along with sons, of only their father's separate property and his "notional" portion of joint family or ancestral property, but had no direct inheritance rights to joint family property itself[2]. Sons, on the other hand, not only inherited their share of the father's own property and his "notional" portion of joint family property but also had a direct right by *birth* to an independent share of the joint family property. Additionally, sons could demand partition of the joint family property while daughters could not. Such an arrangement worked to the disadvantage of women because of the following reasons:

- Firstly, if a father renounced his rights in the coparcenary (joint ownership) property, his sons would continue to maintain their independent rights to the coparcenary but his daughters would lose out on their share of inheritance.

- Secondly, after partition of the coparcenary, if the father made a gift of or willed[3] his share in the coparcenary to his sons, the rights of his female inheritors would again be defeated.

- Thirdly, if a father converted his separate or self-acquired property to coparcenary property, then his daughters, who would have originally enjoyed equal shares in that property along with his sons, would now lose out.

Hence the Hindu Succession Act (HSA) of 1956 was by no means a gender neutral one. Moreover, for millions in rural India, property takes the form of land that is typically family-owned, which makes such gender bias in inheritance rules quite a significant phenomenon.[4]

[2]The same was true for any other female class I heir of the deceased, namely his widow and his mother, where class I heirs are those who have first right to the property of the deceased. See Agarwal (1994) p. 212.

[3]A man has full testamentary power, i.e. the right to will, over all his property, including his interest in the coparcenary - a provision that is often used to disinherit females.

[4]The intricacies of the law are discussed in greater detail in Chapter 1.

2.2.2 State Amendments to the Hindu Succession Act, 1956

Over the course of time, some states have enacted legislation to amend the original inheritance Act. Kerala in 1976, Andhra Pradesh in 1986, Tamil Nadu in 1989, Maharashtra and Karnataka in 1994 amended the HSA to recognize the claims of daughters (still unmarried at the time of passing of the amendment) as joint heirs by birth in joint family property, including the right to a share by survivorship, identical to sons.

It may be argued that such amendments to the inheritance law had the potential to benefit women in these states. Since land constitutes a large share of family property in rural India and almost 78% of rural families own some land (Agarwal, 1994), women in these households stood to gain. And so would their families, as it can be argued that gender equality in land titling may improve agricultural productivity by enabling women to take loans to invest on their land and thereby enhance family income. (Agarwal, 1994) point out that despite undertaking the responsibility of cultivation of household land, many women lack formal titles to it and in the face of large-scale outmigration of their husbands (especially in South India), this prevents them from accessing credit to invest in the land and increase output. Additionally, independent rights to ancestral property for women meant that their shares in joint property would be held intact even if they were disinherited from their father's own property in his will.

2.3 Data and Identification Strategy

2.3.1 Data

The data used in this chapter is obtained from repeated cross-sections of the National Family Health Survey of India (NFHS) conducted in 1992, 1998 and 2005.

The NFHS surveys, which are representative at the state level, include a household sample covering everyone in the sampled households, and an individual sample covering all ever-married women aged 15-49 years within those households. 29 states of India are covered in the sample.[5] However, the Hindu

[5]The 3 newest states of India, i.e. Chattisgarh, Uttarakhand and Jharkhand, were created in 2000, out of Madhya Pradesh, Uttar Pradesh and Bihar respectively. They are part of

Succession Act (1956) did not apply to Jammu and Kashmir (Agarwal 1994). Hence, I drop that state in my analysis and are left with 28 states.

For the child education results, I use the household sample, which contains demographic and socioeconomic information on all members of the household, including age, sex, marital status, relationship to household head, education, caste etc. I focus my attention on the children in nuclear families, born to mothers who are 28 years or older at the time the survey was undertaken.

Now, there exists variation in exposure to reform not only among the mothers but among some of the children of these mothers as well, in particular, daughters. Let us consider an example. A mother born in 1970 in Kerala is not exposed to the reform herself (since Kerala reformed in 1976) but her daughter, who was born in 1990, is exposed to the reform. On the other hand, a mother born in 1980 and her daughter born in 2000 are both exposed to the reform. As Chapter 1 argues, the fathers of those daughters who are directly exposed to the inheritance rights reform would prefer to invest more in their education.[6] Therefore, a daughter may be subject to two potential effects of the reform: one through her mother's exposure to the reform and the second through her own exposure to the reform.[7] In this chapter, I intend to focus solely on the intergenerational effect of the reform on children *through their mothers*, and hence I restrict my sample to children who were themselves fully exposed to the reform in all reforming states, i.e. children born after 1989.[8] The only source of variation then comes from whether or not the mothers of these children were exposed to the reform.

Thus, the three NFHS waves together provide a total sample of 170,677 children (81,921 girls and 88,756 boys) born to 77,178 mothers in an equal number of households in 28 states of India.[9] Year of birth of children ranges

the NFHS wave of 2005, but not of the waves of 1992 and 1998. Addtionally, Sikkim is not a part of the 1992 wave. Smaller Union Territories like Lakshadweep, Andaman and Nicobar Islands, Pondicherry etc. are also excluded.

[6]School-leaving age in India is 15 years. Hence this effect is made possible by the fact that these daughters are of school-going age when the reform is passed, or will soon be.

[7]This would apply to sons as well in case fathers adjusted the level of investment in sons' education in response to the exposure of their daughters to the reform.

[8]Since Kerala, Andhra Pradesh and Tamil Nadu reformed on or before 1989, the children in the restricted sample who belong to these states were thus born after the reform was passed and hence were fully exposed. Maharashtra and Karnataka passed the law in 1994 hence the children in these two states were at most 6 years old when the reform was passed and were also fully exposed.

[9]Of the total 170,677 children in the sample, 13,870 obtain from the 1992 round, 52,909 from the 1998 round and 103,898 from the 2005 round. Of the total 77,178 mothers in the sample, 10,591 obtain from the 1992 round, 24,788 from the 1998 round and 41,799 from

from 1989 to 2006 while that of mothers spans 1918 to 1978.

There exists a concern that the presence of very young children in the sample, i.e. those below 15, may introduce selection bias as most of them would not have finished their education. I address this problem in the main econometric specification below by controlling for child cohort fixed effects, since starting age of school is common across the states of India (Kingdon, 2007).[10]

For the mother's bargaining power and access to credit results, I use the individual sample from the 2005 wave of NFHS, which contains information on ever-married women of the household between the age of 15-49 in 28 states of India.[11] I restrict the sample to the wives of the head of the household[12] who would correspond with the mothers considered in the household sample above.[13] This gives me a sample size of 64,413 women.

The 2005 survey is the only NFHS wave that asks questions that directly speak to the extent to which women are able to make independent decisions on various matters of interest to the household, e.g. "Who decides how to spend money?", "Who has the final say on making large household purchases?", "Who has the final say on the woman's health care?" etc. These questions are used to construct a measure of the woman's bargaining power in the household. The 2005 survey also contains information on the likelihood of the woman owing a bank or savings account. More details on the construction of these

the 2005 round.

[10]A related concern could be that of double counting in my sample. Since I use multiple rounds of the same survey collected some years apart, double counting of the same individual in different rounds may pose a problem, especially in the case of daughters. However, as discussed in Chapter 1, the probability of interviewing the same household in successive sureys is very low. But the concern of double counting is still not fully eliminated if one expects girls interviewed in the earlier waves to be married into other families by the time the later waves took place. However, because the sample is restricted to mothers who are 28 or older at the time of each survey, to be counted as a mother in 1998, a woman has to be 22 or above and counted as a daughter in 1992. The proportion of daughters over 22 in 1992 is around 17%. For double counting between 1992 and 2005, a daughter has to be 15 or above in 1992. The proportion of daughters over 15 in 1992 is 40%. For double counting between 1998 and 2005, a daughter has to be 21 or above in 1998. The proportion of daughtes over 21 in 1998 is 22%. The probability of selection of a household for interview in the NFHS is approximately 0.06 (IIPS, 2007). Hence the probability of double counting between 1992 and 1998, and 1998 and 2005 is approximately 0.01, while that between 1992 and 2005 is approximately 0.03. These are quite low, indicating that the risk of double counting in my sample is minimal.

[11]The reason why this age interval is chosen is that NFHS focuses primarily on health and fertility issues and hence on women of reproductive age.

[12]This includes some female heads as well.

[13]90% of these women are 24 years or older.

Table 2.1: Descriptive Statistics

	Reforming States	Non Reforming States	Difference
Panel A: Children (All NFHS surveys)			
Education in years (girls)	3.63	2.21	1.41***
Education in years (boys)	3.54	2.33	1.21***
Mother's education (years)	4.88	2.99	1.89***
Father's education (years)	6.40	5.55	0.85***
Proportion of HHs owning land	0.33	0.48	-0.15***
No. of HH members	5.75	6.63	-0.88***
Proportion of urban HHs	0.51	0.33	0.18***
Panel B: Mothers (NFHS 2005)			
High bargaining power	0.63	0.64	-0.01
Owns bank account	0.24	0.18	0.06***
Proportion of SC HHs	0.18	0.18	0.00
Proportion of ST HHs	0.05	0.18	-0.13***
Proportion of OBC HHs	0.48	0.28	0.20***
Proportion of GC HHs	0.28	0.34	-0.06***

Notes: * denotes significant at 10%, ** denotes significant at 5%, *** denotes significant at 1%. Panel A contains descriptive statistics for children born after 1989 to mothers who were 28 or older at the time of survey, from 1992, 1998 and 2005 waves of NFHS. Panel B contains descriptive statistics for mothers who were 28 or older at the time of survey from 2005 wave of NFHS. Mother's bargaining power is measured with the help of an score constructed using 6 questions relating to influence enjoyed by the mother in the household decision-making process that were asked in the survey. A dummy is then constructed which takes the value 1 if score is greater than 3.6851, the median score, indicating high bargaining power. See section 6 for further details. Scheduled caste (SC), scheduled tribes (ST), other backward castes (OBC) and general (GC) Hindus denote the caste classification of Hindu society. GC is essentially everyone who is not SC, ST or OBC.

variables are presented in section 2.5 below.

For both the household and individual samples, I construct a state-cohort panel dataset by collapsing my sample by state and year of birth, and present cohort-level results.

Table 2.1 presents the descriptive statistics. In the household sample that looks at the children (Panel A), there appear to be significant differences between the reforming and non-reforming states in terms of observables. Households in reforming states are, on average, more educated, own less land, have smaller families and reside more in urban areas compared to those in non-reforming states. Panel B looks at the mothers, using the individual sample, and reveals significant differences in terms of ownership of bank accounts as well as caste classification.

2.3.2 Identification Strategy

The identification strategy used in this chapter is basically a difference-in-difference, where I compare the difference between mean education of children born to mothers who were young enough to be exposed to the inheritance rights reform ("treatment" group) to that of children born to mothers who were too old to benefit from the reform ("control" group), for reforming states and non-reforming states. The underlying identification assumption is that in the absence of the reform, the evolution of children's education across cohorts of mothers would not have been systematically different between reforming and non-reforming states.

This suggests running the following regression:

$$e_{sck} = \alpha_s + \beta_c + \gamma_k + \delta_s c + \mu_1 M_{s,(k \geq k'-14)} + \mu_2 M_{s,(k'-28 \leq k \leq k'-15)} + \mu_3 M_{s,(k'-42 \leq k \leq k'-29)} + \mathbf{x}_{sk}\theta + \epsilon_{sck} \quad (2.1)$$

The dependent variable e_{sck} is the mean years of education of the children born in year c to mothers born in year k in state s. α_s represents state fixed effects which control for cross-state differences in time-invariant characteristics that affect education of children. β_c denotes child year of birth fixed effects which cover macro-shocks and national policies that may have affected education of younger cohorts of children differently from the older ones. As mentioned earlier, this also controls for the fact that younger cohorts of children who are still in school may have less years of completed education compared to older cohorts who have already completed schooling, across all of India. In addition, I also control for mother year of birth fixed effects, i.e. γ_k to account for differences owing to mother's year of birth. Finally, $\delta_s c$ denotes a linear trend over cohorts of children specific to state s.

Let the reform be passed in year k' in state s. $M_{s,(k \geq k'-14)}$ is a dummy variable equal to one if the mothers born in year k (i.e. belonging to cohort k) were 14 years or younger at the time the reform was passed in their state. Similarly, $M_{s,(k'-28 \leq k \leq k'-15)}$ is a dummy indicating if they were between 15 and 28 years and $M_{s,(k'-42 \leq k \leq k'-29)}$ between 29 and 42 years respectively when the reform was passed in their state. The group of mothers who were 43 years or older at the time of reform constitute the omitted category. $\mathbf{x}_{sk}$ denotes a vector of household level variables that affect children's education. Standard errors are clustered at the state level to take into account any arbitrary corre-

lations of the error term ϵ_{sck} over space and time within each state (Bertrand, Duflo, and Mullainathan, 2004).

The choice of 14 as the cut-off in $M_{s,(k \geq k'-14)}$ follows from the findings of Chapter 1, which show that women who were 14 years or younger at the time of the reform benefit from it, not only in terms of better inheritance rights (since most would have been unmarried at that time) but also in terms of higher levels of education. As a combination of these two effects, the impact of the reform on the education of the children of these women may be expected to be higher compared to the omitted group. Hence, the group of mothers who were 14 or less at the time of reform constitute my "treatment" group. The group of mothers who were 43 years or older at the time of reform were too old to be exposed to the reform and hence constitute the "control" group.

It should, however, be noted that it is not possible to identify separately the effect on child education due to the increase in inheritance rights and that due to increase in education for the "treatment" group of mothers. For this to be done, I would be required to further split this category into 2 groups: one for those who were young enough to go to school at the time of the reform (say 14 or younger) *and* benefit from improved rights, and second for those who were out of school but not yet married when the reform was passed. The impact of the reform on the children of the former group of mothers would derive from both their higher level of education as well as their better inheritance rights. For the latter group, inheritance rights would be the primary driving force behind the effect. Testing between these two effects would provide a way of identifying the so-called "pure" effect of maternal inheritance rights on child education. However, the mean age at marriage of women in my sample is 17, with a lot of girls marrying even earlier at 15 and 16, which implies that such a split is difficult to achieve.

But an attempt can still be made to identify if the effect on children's education goes entirely through improved mothers' education following exposure to the reform.To that extent, I explicitly control for the level of education of mothers in the specification outlined in equation 2.1 above. If the coefficient on $M_{s,(k \geq k'-14)}$ continues to remain significant, then this would provide suggestive evidence that the exposure of mothers to the inheritance rights reform had a direct impact on their children's education over and above the effect through their own education.

The group of mothers who were 15 to 28 at the time of reform, denoted by $M_{s,(k'-28 \leq k \leq k'-15)}$, are less likely to have benefited from the reform. Not

only were they past school-going age by the time the reform was passed (hence could not benefit in terms of education), but most of them were also likely to be married by then. This is because 80% of women in my sample marry between 15-28.[14] Hence very few of these mothers would have enjoyed improved inheritance rights following the reform and thus the impact on the education of their children ought to be quite muted.

The group of mothers who were 29 to 42 at the time of reform, denoted by $M_{s,(k'-42\leq k\leq k'-29)}$, is incorporated primarily as a falsification exercise. All mothers in this group were married by the time the reform happened and did not benefit from improved inheritance rights. Hence, one should observe no significant difference between mean education of children born to this group of mothers in comparison to those born to mothers belonging to the control group.

Hence, the coefficient of interest is μ_1, which captures the impact of the mothers' exposure to the inheritance rights reform on the education of their children. μ_2 and μ_3 capture the corresponding effect on the children of "older" cohorts of mothers. The hypotheses are that $\mu_1 > 0$, $\mu_2 = 0$ and $\mu_3 = 0$, i.e. mothers' exposure to improved inheritance rights led to an improvement in the educational attainment of their children. In addition, it is also interesting to test for the hypotheses that $\mu_1 = \mu_2$ and $\mu_1 = \mu_3$, i.e. whether the effect on the children of the "treatment" mothers (i.e. those fully exposed to the reform) is significantly different from that on children of "older" mothers.

It is important to point out here the source of variation for the different mother cohort categories constructed above. Table 2.A.1 in the appendix provides a clear picture of this. Since the sample has been restricted to mothers who were 28 and above at the time of the survey, the youngest cohort of mothers in my sample were born in 1978 (coming from the 2005 sample).[15] Thus, as Table 2.A.1 shows, the variation in $M_{s,(k\geq k'-14)}$ primarily comes from Kerala, which reformed in 1976, followed by Andhra Pradesh and Tamil Nadu which reformed in 1986 and 1989 respectively. Moreover, the last two states to pass the reform, i.e. Maharashtra and Karnataka, do not contribute to the "treatment" group at all. Mothers in my sample who belong to these states were already 16 by the time the reform was passed in these states in

[14]Marriage is a pretty universal phenomenon for women in Inda. 99% marry by the age of 28. The percentage of never married women in India in the age group of 25-59 is around 2.5 (Government of India, 2001).

[15]Some of the interviews in the 2005 wave were carried out in 2006, hence the youngest cohort is that of 1978 rather than 1977.

1994. Hence, these two states primarily contribute to the variation in the older cohort categories, i.e. $M_{s,(k'-28\leq k\leq k'-15)}$ and so on.

2.4 Main Results

I look at the impact of mothers' exposure to the inheritance rights reform separately on girls and boys. Preference for male children in many low income countries is often found to lead to differential treatment of girls and boys in many spheres. Hence, it would be interesting to investigate whether a gender differential exists regarding the intergenerational impact of maternal inheritance rights on child education.

2.4.1 Girls

Table 2.2 presents estimates of equation 2.1 for girl children. In column 1, without controlling for any fixed effects or trends, mean education of daughters born to all groups of mothers is significantly higher compared to the omitted category. However, controlling for state and child year of birth fixed effects in column 2, I find that the effect on children of mothers who were 14 or younger at the time of reform continues to remain positive and significant (i.e. $\mu_1 > 0$ and significant), but that on children of the "older" cohort of mothers is no longer significant and substantially diminished in magnitude. This continues to be the case even after mother year of birth fixed effects and state-specific linear child cohort trends are included in column 3.

Thus, the suggested effect is that being born to a mother who was exposed to the inheritance rights reform in her youth increased the average education of her daughters by 1.34 years, relative to the comparison group. The corresponding effect on daughters born to mothers who were 15-28 at reform is 0.56 and insignificantly different from zero (i.e. $\mu_2 = 0$). This implies that these daughters did not benefit from higher levels of education because the exposure of their mothers to the reform was limited. F-test 1 reveals that the coefficient for the daughters of the 14 or less group is significantly different from that for the daughters of the 15-28 group.

Daughters born to mothers who were 29-42 at the time of reform do not display any differential effect in terms of average educational attainment compared to the control group (i.e. $\mu_3 = 0$). This falsification exercise improves our confidence in the validity of the identification strategy used in the chapter.

Table 2.2: Effect on Daughters' Education

	Years of education				
	(1)	(2)	(3)	(4)	(5)
Mothers aged 14 or less at reform	1.29***	1.60**	1.34**	1.29**	1.17**
	(0.27)	(0.64)	(0.56)	(0.58)	(0.58)
Mothers aged 15 to 28 at reform	1.52***	0.89	0.56	0.50	0.38
	(0.18)	(0.62)	(0.50)	(0.52)	(0.52)
Mothers aged 29 to 42 at reform	1.11***	-0.36	0.07	-0.01	-0.16
	(0.25)	(0.36)	(0.27)	(0.28)	(0.28)
Mother's education				0.06***	0.01
				(0.01)	(0.01)
Father's education					0.03***
					(0.01)
Owns land					0.21**
					(0.08)
No. of HH members					-0.06***
					(0.02)
Urban					0.64***
					(0.17)
F-test 1	0.58	13.71	10.79	10.25	10.36
	[0.45]	[0.00]	[0.00]	[0.00]	[0.00]
F-test 2	0.28	32.39	12.01	11.50	12.37
	[0.60]	[0.00]	[0.00]	[0.00]	[0.00]
F-test 3	2.53	20.86	3.77	3.78	4.41
	[0.12]	[0.00]	[0.06]	[0.06]	[0.04]
Adj. R-sq	0.07	0.55	0.76	0.76	0.76
No. of observations	10574	10574	10574	10570	10563
State FE	NO	YES	YES	YES	YES
Child year of birth FE	NO	YES	YES	YES	YES
State-specific child cohort trend	NO	NO	YES	YES	YES
Mother year of birth FE	NO	NO	YES	YES	YES

Notes: Standard errors, clustered at state level, are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%. The omitted category is mothers aged 43 years or more at the time of reform. F-test 1 reports F-statistics (p-values in brackets) for the null that the coefficient on mothers aged 14 or less at reform is equal to that on mothers aged 15-28 at reform; F-test 2 for the null that the coefficient on mothers aged 14 or less is equal to that on mothers aged 29-42; F-test 3 for the null that the coefficient on mothers aged 15-28 is equal to that on mothers aged 29-42. All regressions are weighted by cell sizes.

F-test 2 reveals that this coefficient is also significantly different from that on daughters of the 14 or less group.

However, as mentioned earlier, mothers who were exposed to the inheritance rights reform not only gained from better inheritance rights but a higher level of education as well. Hence, to test if the estimated effect of the mothers' exposure to the reform on daughters' education goes entirely through mothers' education, I explicitly control for the level of maternal education in column 4 of Table 2.2. I find that the coefficient on the daughters born to "treatment" mothers continues to be positive and significant, albeit diminished in magnitude compared to column 3, and significantly different from that on daughters

of "older" mothers (F-tests 1 and 2). Mother's education is found to be positively associated with daughters' education, but cannot account for the entire effect observed on daughters. This provides suggestive evidence that better inheritance rights of mothers following the reform had a direct impact on the educational attainment of their daughters, which is distinct from the maternal education effect. It is also interesting to note that after controlling for the education of mothers, the magnitude of the coefficient for daughters of mothers who were 29-42 at the time of reform is now negative and insignificant.

These results are also robust to the inclusion of other household covariates of child education, including father's education, land ownership, number of household members and location of household (column 5). Daughters born to "treatment" mothers now gain on average an additional 1.17 years of education compared to those born to "control" mothers, an improvement of 18%. Daughters born to "older" mothers continue to exhibit no significant effect of the reform. The respective F-tests continue to reject the equality of these coefficients.

The household controls are found to have the expected effect on girls' education. Educational attainment of fathers is positively correlated with daughters' education. It is interesting to note that once levels of paternal education is controlled for, the coefficient on maternal education becomes insignificant and also diminishes in magnitude. A possible interpretation might be that a higher level of education helps women get more educated husbands who are keen to invest more in their daughters' education. Landed households are found to educate their daughters more, while larger families educate their daughters less, presumably due to added pressure on the household budget. Girls in urban families are more educated, which may be explained by access to better schooling facilities in cities.[16]

2.4.2 Boys

The results for boys are reported in Table 2.3. Without controlling for any fixed effects or trends, I find that mean education of sons born to all groups of

[16]There may arise a concern regarding multicollinearity in the model if it is believed that these control variables are correlated. To address this concern, I test for multicollinearity using the Variance Inflation Factor (VIF) for each control variable (Hamilton, 1994). The inverse of the VIF tells us what proportion of the variance of an explanatory variable is independent of the other explanatory variables. A low proportion (in the range of 0.10 or less) indicates multicollinearity. In my case, the lowest is 0.42 for "mother's education", which indicates that the threat of multicollinearity is minimal.

Table 2.3: Effect on Sons' Education

	Years of education				
	(1)	(2)	(3)	(4)	(5)
Mothers aged 14 or less at reform	0.89***	1.26*	0.75	0.72	0.62
	(0.24)	(0.72)	(0.59)	(0.58)	(0.60)
Mothers aged 15 to 28 at reform	1.36***	0.64	0.24	0.20	0.11
	(0.17)	(0.74)	(0.58)	(0.57)	(0.58)
Mothers aged 29 to 42 at reform	0.90***	-0.77*	-0.43	-0.51	-0.61*
	(0.30)	(0.43)	(0.34)	(0.33)	(0.35)
Mother's education				0.06***	0.02*
				(0.01)	(0.01)
Father's education					0.03***
					(0.01)
Owns land					0.11
					(0.07)
No. of HH members					-0.05*
					(0.02)
Urban					0.41***
					(0.13)
F-test 1	2.90	11.17	7.36	7.59	8.08
	[0.09]	[0.00]	[0.01]	[0.01]	[0.00]
F-test 2	0.00	36.00	13.39	14.32	15.42
	[0.97]	[0.00]	[0.00]	[0.00]	[0.00]
F-test 3	1.73	19.66	5.77	6.48	7.30
	[0.19]	[0.00]	[0.02]	[0.01]	[0.01]
Adj. R-sq	0.05	0.55	0.76	0.77	0.77
No. of observations	10721	10721	10721	10713	10709
State FE	NO	YES	YES	YES	YES
Child year of birth FE	NO	YES	YES	YES	YES
State-specific child cohort trend	NO	NO	YES	YES	YES
Mother year of birth FE	NO	NO	YES	YES	YES

Notes: Standard errors, clustered at state level, are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%. The omitted category is mothers aged 43 years or more at the time of reform. F-test 1 reports F-statistics (p-values in brackets) for the null that the coefficient on mothers aged 14 or less at reform is equal to that on mothers aged 15-28 at reform; F-test 2 for the null that the coefficient on mothers aged 14 or less is equal to that on mothers aged 29-42; F-test 3 for the null that the coefficient on mothers aged 15-28 is equal to that on mothers aged 29-42. All regressions are weighted by cell sizes.

mothers is significantly higher compared to the comparison group (column 1). But with the inclusion of state fixed effects, child year of birth fixed effects, mother year of birth fixed effects and state-specific linear child cohort trends, I find no significant impact of mothers' exposure to the inheritance rights reform on the mean education of sons for any of the cohort groups (column 3). This is in stark contrast with the results for the daughters obtained in Table 2.2. The magnitude of the coefficient on sons born to "treatment" mothers (i.e. 14 or less at the time of reform) is also much smaller compared to that in the case of the girls.

These results do not change once the level of maternal education is con-

trolled for in column 4. Educational attainment of mothers is positively associated with sons' education, just as in the case of daughters, but no direct effect of the mothers' improved inheritance rights is observed on the mean education of sons born to "treatment" mothers, in contrast to what I obtain for daughters in Table 2.2. Inclusion of other household controls in column 5 further diminishes the magnitude of the coefficients for the sons of the 14 or less mothers and 15-28 mothers. The coefficient for the 29-42 mothers is now negative and significant at 10%.

It is interesting to note that most of the household variables have similar coefficients for girls and boys, but the reform variables are significant only for the girls. Such a finding may be interpreted as suggesting that an increase in a mother's inheritance rights disproportionately benefits her daughters compared to sons. This is probably indicative of a compensating behaviour on the part of mothers following their empowerment through inheritance rights, since daughters are traditionally discriminated against in Indian families. More attention is paid to sons' education because, according to social norms, sons are expected to take care of parents in old age. Investing in the education of sons enhances their future income earning potential, which in turn is strongly correlated with transfers parents may expect from them in future. Daughters, on the other hand, are traditionally expected to marry and migrate to their husband's household such that returns from investments in their education are lost to their parents. However, under the assumption that the household may not function as a unitary entity, mothers may have different preferences over child outcomes compared to fathers, and prefer to invest more in their daughters compared to sons. With improved maternal inheritance rights, this is reflected in the differential effects on education of girls compared to boys.

Such an argument seems to suggest that the mechanism driving the direct impact of maternal inheritance rights reform on child education is that of improved bargaining power of mothers. However, it may also be argued that improved inheritance rights of mothers provide an additional source of asset ownership that increases the asset pool of the household. This provides the household with greater access to credit (owing to the enlarged size of collateral at the household's disposal) that, in turn, enables them to finance their children's education.[17] Under the assumption that fathers also want to invest in

[17]It is not, however, clear apriori whether total household property would actually increase as a result of the female inheritance rights reform, as men now have to share their ancestral property with their sisters and may thus have less for themselves.

the education of their daughters but are prevented only by credit constraints, improvement in maternal inheritance rights may be found to improve education of daughters since they were lagging behind sons to begin with. Which of these two mechanisms are at work here is an empirical question. In order to identify the underlying mechanism, I separately analyse the impact of mothers' exposure to the reform on their intra-household bargaining power and their access to credit in the following section.

2.5 Disentangling the Mechanisms

In order to shed light on the underlying mechanism of the direct impact of maternal inheritance rights reform on child education, I use the individual sample of the NFHS 2005 wave. As described above, this is a representative sample of ever-married women in 28 states of India between the ages of 15 and 49. I restrict my sample only to the mothers of the household.

The NFHS 2005 contains questions that explicitly relates to the extent of "say" these mothers enjoy in the decision-making process of the household, i.e. their bargaining power. In particular, the 6 questions I use in my analysis are "Who decides how to spend money?", "Who has the final say on making large household purchases?", "Who has the final say in making household purchases for daily needs?" "Who has the final say on healthcare?", "Who has the final say on visits to family or relatives?" and "Who has the final say on deciding what to do with the money the husband earns?". Each of these questions are coded using a dummy variable that takes the value 1 if the answer is "the respondent alone" or "respondent and husband/partner" and 0 if the answer is "husband alone" or "someone else"[18]. I then construct a "say" score as the sum of these 6 dummy variables that can take the values of 0 through 6.

For the collapsed dataset, the median "say" score is 3.68. I next construct a dummy indicating "high" bargaining power, which equals 1 if the "say" score for a state-cohort cell is greater than 3.68 and 0 if it is less. This dummy is used as the dependent variable in the analysis of the impact of exposure to the reform on mother's bargaining power.

Since the age of these mothers vary betwen 15-49, one might be worried that the presence of very young mothers (e.g. 15 year olds) may introduce selection bias in the sample as very young brides are likely to enjoy lower bargaining

[18]Typically these would be members of the woman's in-law family, e.g. the mother-in-law.

power in their marital households. However, 90% of these women are 24 years or older in my sample, hence there appears to be less scope for this particular problem. Also, the presence of mother cohort fixed effects in the econometric specification should help mitigate this problem under the assumption that the difference in bargaining power between young and old cohorts does not vary across states.

As regards access to credit, the 2005 survey asks each mother whether or not she owns a bank or savings account, which I use as a proxy for her access to credit. Although this is an imperfect measure, it provides a sensible first pass at analyzing the impact on the mother's access to credit since owning a bank account is often a prerequisite for borrowing in the formal sector. However, it should be borne in mind that this would not capture the impact through informal borrowing, and hence may underestimate the true effect of the reform.

The regression specification used in this section is similar to that outlined in equation 2.1:

$$y_{sk} = \alpha'_s + \gamma'_k + \delta'_s k + \mu'_1 M_{s,(k \geq k'-14)} + \mu'_2 M_{s,(k'-28 \leq k \leq k'-15)} + \mathbf{x}_{sk}\theta + \epsilon_{sk} \quad (2.2)$$

The dependent variables, denoted by y_{sk}, are mothers' bargaining power and access to credit. I have the same mother cohort groups here as in the child education analysis, except for the 29-42 group. This is because the earliest mother cohort in this sample is that of 1956 whereas to be 42 at the time of reform, a woman needed to be born between 1934 and 1952.[19] Hence, the omitted category in this analysis is the group of mothers who were 29 and above at the time of reform. The exposed or "treatment" group continues to be mothers aged 14 or less at the time of reform.

I control for state fixed effects, mother year of birth fixed effects and state-specific linear trends across mother cohorts as well as household variables denoted by $\mathbf{x}_{sk}$. Standard errors are clustered at the state level. The source of variation for the different mother cohort categories is reported in Table 2.A.2 of the appendix.

Table 2.4 presents the results on the bargaining power of mothers. Column 1 controls for other factors affecting bargaining power through state and mother year of birth fixed effect alone, and finds there is no significant differ-

[19]This sample consists of mothers who were 15-49 at the time of survey, hence the year of birth of these mothers span 1956-1990. Kerala is the earliest state to reform in 1976 while Maharashtra and Karnataka are the last to reform in 1994. Hence to be 42 at the time of reform, one needs to be born in 1934 in Kerala and 1952 in Maharashtra and Karnataka.

ential impact of exposure to the reform on the the bargaining power of the "treatment" group of mothers compared to the "control" group. However, including state-specific linear mother cohort trends in column 2 gives a positive and significant coefficient. Being exposed to the inheritance rights reform leads to an increase in the probability of mothers having "high" bargaining power by 0.19. Even after controlling for household level covariates like caste and location, the effect continues to be very similar for the "treatment" cohorts of women (column 3). The coefficient on the women who were 15-28 at the time of the reform, on the other hand, is 0.10 but insignificant. It is possible that a small fraction of the women in this category were still unmarried at the time of the reform and hence benefited from improved inheritance rights, hence the magnitude of the coefficient is somewhat large, but the effect is not identified. I am also unable to reject the null that the coefficient on the mothers who were 14 or less is equal to that on mothers who were 15-28 at the time of reform.

As far as the covariates are concerned, Scheduled Tribe women are more likely to enjoy high intra-household bargaining power compared to the omitted category of General Caste. This is not surprising as tribal societies in India are often believed to be quite gender progressive (de Haan, 2006). Predictably, urban women are also more likely to have high bargaining power compared to their rural sisters.

I now turn to the impact of exposure to the reform on the access to credit enjoyed by these mothers. The results are reported in Table 2.5. I use the same regression specification as outlined in equation 2.2 above. I find that the proportion of mothers who owned bank accounts did not differ significantly between the cohorts that were exposed to the reform (14 or less) and those who were not (29 or more). SC women are more likely to own a bank account compared to General Caste women, probably owing to targeted lending programmes of the government. Urban women are also more likely to own a bank account compared to rural women.

These results provide suggestive evidence in favour of the bargaining power channel explaining the direct impact of maternal inheritance rights on child education. Mothers who benefited from improved inheritance rights as a result of exposure to the reform seem to have enjoyed greater bargaining power in their marital households that was manifested through an improvement in the education of their daughters.

An important point to note here is that in this analysis, I speak of property inheritance rights of women that are secure. Weak property rights would

Table 2.4: Effect on Mothers' Bargaining Power

	High Bargaining Power		
	(1)	(2)	(3)
Mothers aged 14 or less at reform	0.21	0.19***	0.18***
	(0.15)	(0.04)	(0.04)
Mothers aged 15 to 28 at reform	0.06	0.11	0.10
	(0.09)	(0.08)	(0.09)
SC			0.11
			(0.20)
ST			0.26*
			(0.14)
OBC			0.08
			(0.16)
Urban			0.21*
			(0.12)
F-test	4.17	1.35	1.40
	[0.05]	[0.25]	[0.24]
Adj. R-sq	0.50	0.53	0.53
No. of observations	2082	2082	2063
State FE	YES	YES	YES
Mother year of birth FE	YES	YES	YES
State-specific mother cohort trend	NO	YES	YES

Notes: Standard errors, clustered at state level, are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%. NFHS 2005 is used. Mother's bargaining power is measured with the help of an score constructed using 6 questions relating to influence enjoyed by the mother in the household decision-making process that were asked in the survey. The dependent variable is a dummy which takes the value 1 if score is greater than 3.6851, the median score. See section 2.5 for further details. SC refers to Scheduled Caste, ST refers to Scheduled Tribe and OBC refer to Other Backward Caste. The omitted category is General Caste. F-test reports F-statistics (p-values in brackets) for the null that the coefficient on mothers aged 14 or less at reform is equal to that on mothers aged 15-28 at reform. All regressions are weighted by cell sizes.

Table 2.5: Effect on Mother's Access to Credit

	Own a Bank Account		
	(1)	(2)	(3)
Mothers aged 14 or less at reform	-0.02	0.01	0.01
	(0.03)	(0.04)	(0.04)
Mothers aged 15 to 28 at reform	-0.02	0.01	0.02
	(0.02)	(0.02)	(0.02)
SC			0.13***
			(0.04)
ST			0.03
			(0.03)
OBC			0.01
			(0.05)
Urban			0.10***
			(0.03)
F-test 1	0.00	0.01	0.03
	[0.95]	[0.91]	[0.86]
Adj. R-sq	0.56	0.59	0.61
No. of observations	2164	2164	2140
State FE	YES	YES	YES
Mother year of birth FE	YES	YES	YES
State-specific mother cohort trend	NO	YES	YES

Notes: Standard errors, clustered at state level, are in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%. Access to credit is proxied by the proportion of mothers who have a bank or savings account. SC refers to Scheduled Caste, ST refers to Scheduled Tribe and OBC refer to Other Backward Caste. The omitted category is General Caste. F-test reports F-statistics (p-values in brackets) for the null that the coefficient on mothers aged 14 or less at reform is equal to that on mothers aged 15-28 at reform. All regressions are weighted by cell sizes.

undermine the entire efficacy of the bargaining power argument. For example, if a woman owns a piece of land only in name but the operational rights of the land lie with her husband or any other male relative in her husband's family, then it is possible that with time, the latter will come to recognize the land as his "own", which will eventually rob the woman of her "say" in the family (Duflo 2005). Indeed, the existence of such a possibility points to the importance of "effective implementation" of the inheritance right amendments in the enacting states. In this chapter, I use inheritance right legislation rather than its implementation as the primary source of variation in female inheritance rights. To the extent that not all amendments were fully implemented, the estimated impact obtained in my analysis is likely to provide a lower bound on the true effect of the implemented reform.

2.6 Conclusion

In this chapter, I argue that that empowering women with independent property inheritance rights in India significantly increased the average educational attainment of their daughters but had little effect on that of their sons. A possible mechanism explaining such an effect may be increased bargaining power enjoyed by such women in the household decision-making process of their marital households, which in turns leads to better representation of their preference in resource allocation, resulting in better daughter outcomes. An alternative mechanism maybe through increased access to credit following expansion of mothers' inheritance rights, which enables households to finance children's education.

I provide suggestive evidence in favour of the bargaining power hypothesis by showing that empowering mothers with greater inheritance rights is associated with an improvement in their say in household decisions. These are the same cohorts of mothers whose children, on average, do better in terms of educational outcomes. I do not find evidence that the reform was associated with increased activity of these cohorts of mothers in relation to formal sector lending.

From a policy standpoint, the findings of this chapter provide empirical support for reforming gender-biased property rights, which is often a persistent trait observed in many traditional and poor societies. Not only does such a reform have the potential to positively impact outcomes of the women for

whom it is intended, as discussed in Chapter 1, but it is also shown to have an intergenerational impact on the outcomes of the children of these women, in particular girls. Hence, it may be argued that property rights reform in favour of women has the potential of enabling families to break the vicious circle of poverty that continue to characterize the societies of a number of developing countries even today.

2.A Appendix

Table 2.A.1: Number of Mothers of a Given Age at the Time of Reform in Reforming States: All NFHS

Age at reform	Andhra Pradesh	Karnataka	Kerala	Maharashtra	Tamil Nadu	Total
-2	0	0	79	0	0	79
-1	0	0	89	0	0	89
0	0	0	144	0	0	144
1	0	0	87	0	0	87
2	0	0	94	0	0	94
3	0	0	81	0	0	81
4	0	0	115	0	0	115
5	0	0	258	0	0	258
6	0	0	225	0	0	225
7	0	0	222	0	0	222
8	465	0	205	0	0	670
9	219	0	179	0	0	398
10	670	0	191	0	0	861
11	227	0	105	0	293	625
12	334	0	197	0	294	825
13	212	0	150	0	406	768
14	191	0	96	0	181	468
15	791	0	120	0	354	1,265
16	529	386	63	384	220	1,582
17	381	176	68	262	259	1,146
18	408	635	52	994	761	2,850
19	216	136	29	270	445	1,096
20	480	269	30	523	476	1,778
21	161	134	22	304	400	1,021
22	292	146	22	255	279	994
23	162	955	23	1,477	354	2,971
24	184	355	17	623	198	1,377
25	231	491	6	808	288	1,824
26	114	367	7	524	186	1,198
27	71	222	7	443	164	907
28	71	422	3	761	157	1,414
29	80	195	1	311	101	688
30	65	368	2	523	96	1,054
31	39	188	2	295	61	585
32	50	161	0	184	61	456
33	28	275	0	385	43	731
34	31	111	0	149	27	318
35	29	112	0	149	40	330
36	9	85	0	109	19	222
37	1	62	2	55	13	133
38	5	86	0	64	13	168
39	7	55	1	54	10	127
40	16	106	0	80	3	205
41	5	41	0	30	1	77
42	1	24	0	29	0	54
43	4	47	0	62	3	116
44	0	14	1	9	0	24
45	4	17	0	6	1	28
46	0	11	0	8	0	19
47	0	10	0	6	0	16
48	1	7	0	11	0	19
49	0	4	0	3	0	7
50	0	7	0	5	0	12
51	0	1	0	1	0	2
52	0	1	0	0	0	1
53	0	6	0	8	0	14
55	0	1	0	1	0	2
57	0	2	0	0	0	2
58	0	1	0	0	0	1
59	0	1	0	0	0	1
62	0	0	0	1	0	1
67	0	1	0	0	0	1
Total	6,784	6,694	2,995	10,166	6,207	32,846

Table 2.A.2: Number of Mothers of a Given Age at the Time of Reform in Reforming States: NFHS 2005

Age at reform	Andhra Pradesh	Karnataka	Kerala	Maharashtra	Tamil Nadu	Total
-12	0	0	2	0	0	2
-11	0	0	3	0	0	3
-10	0	0	3	0	0	3
-9	0	0	4	0	0	4
-8	0	0	8	0	0	8
-7	0	0	10	0	0	10
-6	0	0	15	0	0	15
-5	1	0	17	0	0	18
-4	9	0	21	0	0	30
-3	10	0	29	0	0	39
-2	43	0	37	0	2	82
-1	54	0	50	0	1	105
0	97	0	51	0	7	155
1	61	0	54	0	16	131
2	129	0	80	0	23	232
3	109	2	50	3	58	222
4	98	4	69	11	73	255
5	231	13	90	7	81	422
6	154	20	80	13	84	351
7	143	34	74	27	106	384
8	226	40	90	68	119	543
9	117	51	84	56	156	464
10	253	80	98	93	135	659
11	110	83	64	105	154	516
12	141	74	85	135	142	577
13	124	128	91	145	185	673
14	105	113	67	127	121	533
15	337	111	93	173	157	871
16	173	125	55	146	135	634
17	118	106	68	190	172	654
18	161	164	87	234	204	850
19	90	125	36	180	152	583
20	294	133	0	189	149	765
21	104	123	0	200	157	584
22	109	124	0	191	91	515
23	85	161	0	240	204	690
24	93	127	0	220	135	575
25	226	113	0	197	142	678
26	104	123	0	170	110	507
27	78	99	0	166	113	456
28	106	141	0	234	174	655
29	61	123	0	193	104	481
30	7	101	0	166	104	378
31	0	94	0	157	100	351
32	0	92	0	157	40	289
33	0	100	0	128	0	228
34	0	102	0	150	0	252
35	0	86	0	115	0	201
36	0	70	0	124	0	194
37	0	38	0	96	0	134
38	0	0	0	5	0	5
Total	4,361	3,223	1,665	4,811	3,906	17,966

Chapter 3

Land Reform and Agricultural Productivity in India: A Re-examination of the Evidence

3.1 Introduction

Increasing importance is nowadays being accorded to the role of property rights in the process of economic development (Besley and Ghatak, 2009), especially in light of the institutional approach to thinking about development due to North (1990). Institutions are the incentive systems that structure human interaction in society and property rights constitute an important element of such a system. By defining ownership over inputs and providing investment incentives, property rights are argued to improve productivity and play a vital role in the growth process of a country.

Policies aimed at extending and improving property rights have been argued to be a central mechanism for improving the lives of the poor (De Soto, 2000, 2001). In a poor agrarian economy, characteristic of many less developed countries, this implies improving the terms on which the poor have access to land. Land reforms constitute an important form of redistributive policy that seeks to transfer property rights to the poor.

Until recently, there existed few rigorous attempts to study the impact of land reform on agricultural performance. This is not surprising as there are serious conceptual issues in trying to measure such an impact. For example, the amount of land area directly affected by the reform is not the appropriate measure of its success as measures may be taken in anticipation of or in

reaction to the reform (e.g. eviction of tenants, or land sales) whose impact must be considered while studying the aggregate effects of the reform. Also, implementation of land reform is likely to be correlated with other government policies and economic trends, which in turn are likely to be correlated with outcome measures of interest, such as agricultural productivity and poverty, making causal inference difficult.

Some of the key papers to examine the impact of land reform on agricultural productivity are Besley and Burgess (2000) and Banerjee, Gertler, and Ghatak (2002). Both these papers focus on India and exploit India's post-independence land reform policy as a "natural experiment" to examine the effect of a major change in property rights on agricultural productivity. While Besley and Burgess (2000) - henceforth BB - take advantage of variation in land reform legislation across states of India over time[1] to identify the impact, Banerjee, Gertler, and Ghatak (2002) - henceforth BGG - exploit district-wise variation in implementation of tenancy reforms[2] in one of the states of India, i.e. West Bengal. Using per capita real agricultural state domestic product and agricultural yields as their dependent variables, BB find a negative and significant effect of land reform on agricultural productivity across India[3], while using rice yields as their dependent variable, BGG find a positive and significant effect in West Bengal.

In this chapter, we contribute to the empirical literature on the impact of land reform on agricultural productivity by attempting to understand in greater detail the potential channels through which the effect of land reform permeates. We argue that focusing on aggregate effects of land reforms (as has been done by certain existing studies, including BB) may conceal a range of heterogeneous impacts at a more disaggregated level. A thorough examination of these disaggregated effects, as undertaken in this chapter, facilitates our understanding of the full breadth of the impact of land reform, as well as helps us shed light on possible reasons behind the apparent disparity in results obtained in the existing literature, in particular, between BB and BGG as

[1]The 1949 Constitution of India left the adoption and implementation of land reforms to state governments, which led to a lot of variation in the execution of these reforms across states and over time (Besley and Burgess, 2000).

[2]Tenancy reforms constitute one of the four components of the land reform policy passed in various states of India, as discussed in more detail later.

[3]Although the focus of BB is to primarily test whether land reform legislation is associated with poverty reduction in India, both in an aggregate sense as well as disaggregated by type of land reform, they also discuss the impact on agricultural yields in Section V of their paper.

refered to above.

Augmenting the data from BB with new yield statistics, we find that although overall, aggregate land reform legislation seems to have had a negative and significant impact on agricultural productivity in India, this hides considerable variation across types of land reform, as well as across states. Disaggregating by type of land reform, the main driver of this negative effect appears to be land ceiling legislation. In contrast, the effect of tenancy reform, averaged across all states, is positive and even significant once relevant economic and policy variables are controlled for. This is in contrast with the finding in BB, who report a negative and significant effect of tenancy reform on agricultural productivity, but in line with that in BGG who find a positive and significant effect.

We also look at the effect of land reform on productivity for each state separately, which has not been attempted before, and find evidence of considerable heterogeneity across states. For example, in West Bengal, one of the few states to have implemented tenancy laws rigorously, we find that the overall negative relationship between land reform and productivity is absent, while it continues to persist for some of the other states. We argue that a plausible explanation for such inter-state heterogeneity in land reform experience may be found in the differential emphasis laid by states on different components of land reform, particularly ceiling versus tenancy laws, which may also help explain some of the apparent disparity in results between BB and BGG.

Land reforms are likely to be associated with some costs as well. For example, regulation of tenancy in the form of security of tenure may have the negative effect of reducing the incentive of landowners to lease out land, which may work against the positive effect of the reform that operates through the reduction in Marshallian sharecropping distortions. In this chapter, we also provide suggestive evidence regarding some of the indirect and unintended effects of land reform. Using NSS data, we find that tenancy reform seems to have increased the inequality of operational holdings in India once we exclude West Bengal, which suggests that in anticipation of the new tenancy legislation, landlords could potentially be engaging in eviction of tenants in states other than West Bengal, where tenancy reforms are known to have been poorly implemented.

The plan of the chapter is as follows. In the next section, we discuss the background of land reforms in India. The third section outlines the economic arguments in favour of land reforms. In the fourth section, we discuss the

evidence on the impact of land reforms on agricultural productivity and distribution of land in India. Our focus is on productivity, but we also cite evidence on other outcome variables of interest such as poverty. The final section concludes.

3.2 Background of Land Reforms in India

Land reform, in general parlance, refers to redistribution of land from the rich to the poor. More broadly, it may include regulation of ownership, operation, leasing, sales, and inheritance of land. In an agrarian economy such as India, with great scarcity and an unequal distribution of land, coupled with a large mass of the rural population below the poverty line, there exist compelling economic and political arguments for land reform. Not surprisingly, it received top priority on the policy agenda at the time of the Indian Independence in 1947.

In the decades following Independence, India passed a significant body of land reform legislation (Thorner, 1976). Land reforms in India consisted of four main categories: tenancy reform, abolition of intermediaries, land ceiling and land consolidation. The first type of land reform i.e. tenancy reform, imposed regulation that attempted to improve the contractual terms faced by tenants, including crop shares and security of tenure.[4] The second type of land reform was abolition of intermediaries. Under the British land-revenue system, large feudal landowners (*zamindars*) received the rights to collect tributes from peasants in exchange for a land tax paid to the state. Almost half of the land was under this system at the time of Independence. This system was considered exploitative, and abolition of intermediaries was aimed at curtailing the power of these large landowners and ensuring that the cultivator of the land was in direct contact with the government, which minimized unjust extraction of surplus by the landowner.[5] The third form of land reform was the imposition of a ceiling on landholdings that aimed to redistribute surplus land to the landless. Finally, consolidation of land holdings constituted the fourth kind of land reform, which ensured that small bits of land belonging to the same

[4]Under this reform, if tenants were registered with the State Department of Land Revenue, they would be entitled to permanent and inheritable tenure on the land they sharecropped as long as they paid at least 25% of output as rent (Banerjee, Gertler, and Ghatak, 2002).

[5]This measure did not aim at abolishing the ownership of large amounts of land, but only of the specific right of revenue collection by the landowners (Kuhnen, 1982).

small landowner but situated at some distance from one another could be consolidated into a single holding to boost viability and productivity. Because of variation in land quality across plots, this measure has been difficult to implement.[6]

Abolition of intermediaries is generally agreed to be one component of land reforms that has been relatively successful.[7] The record in terms of the other components is mixed and varies across states and over time. For example, under the ceiling law only 1.7% of total cultivated area has been declared surplus and only 1% of it has been redistributed (Mishra and Puri, 2000). Landowners resisted the implementation of these reforms by directly using their political clout and also by using various methods of evasion and coercion, which included registering their own land under names of different relatives to bypass the ceiling, shuffling tenants around different plots of land so that they would not acquire incumbency rights as stipulated in the tenancy law, and possibly even outright eviction.[8]

The general assessment on land reforms in the Indian context is rather dismal. For example, the report of the Task Force on Agrarian Relations of the Planning Commission of India (1973) had the following overall assessment of land reforms in India: "The programmes of land reform adopted since Independence have failed to bring about the required changes in the agrarian structure." The report directly blames the political will of the state governments for this failure:

> "The lack of political will is amply demonstrated by the large gaps between policy and legislation and between law and its implementation. In no sphere of public activity in our country since Independence has the hiatus between precept and practice, between policy pronouncements and actual execution been as great as in the domain of land reforms."

Indeed, the two states in which land reform is widely considered to have been successful are West Bengal and Kerala (Appu, 1996), (Government of

[6]See Joshi (1975) for a discussion of land reform legislation in India and their implementation. BB also provide a systematic description of these laws and their amendments that were passed in individual states over time. According to their data, the first land reform legislation was passed by Gujarat in 1948 and the latest by Bihar in 1986 (their dataset ends in 1992).

[7]Kuhnen (1982) points out that by the mid-fifties, the intermediaries had been abolished. The farmers - more than 20 million in India at the time- had come into direct contact with the government to whom they directly paid their taxes.

[8]Often, such eviction was euphemistically referred to as voluntary surrender, although in most cases they would be anything but voluntary.

West Bengal, 2004), and in both cases it was pushed forward by left-wing administrations. These two states accounted for 11.75 and 22.88% respectively, of the total number of tenants conferred ownership rights (or protected rights) under tenancy reform legislation up to the year 2000, despite being home to only 7.05 and 2.31% of India's population respectively (Government of India, 2000). As regards implementation of land ceiling laws, West Bengal's share of total surplus land distributed was close to 20% of the all-India figure, although the state accounts for only about 2.7% of India's land resources (DFID, 2007). This points to the significant differences in the experience of different states in the context of land reform implementation in India, to which we will return later.

3.3 Economic Arguments for Land Reform

Land reform policy in India had two specific objectives:

The first objective was to remove impediments to improvement in agricultural production that arise from the agrarian structure inherited from the past. This would help to create conditions for the evolution of an agricultural economy with high levels of efficiency and productivity. The second objective, which is closely related to the first, was to eliminate all elements of exploitation and social injustice within the agrarian system, to provide security for the tiller of soil and assure equality of status and opportunity to all sections of the rural population (Government of India, 1961).

In a land-scarce country with a significant section of the rural population below the poverty line, the case for ensuring that everyone has access to some minimum amount of land seems compelling from the point of equity. However, this is a general argument in favour of redistribution, not necessarily redistribution in kind (i.e. land). To make the case for the latter, one needs to understand the economic forces that govern the allocation of land and labour. Indeed, in the Five-Year Plan documents, it is clearly recognized that the equity and efficiency arguments in favour of land reform are related because of the inherent constraints in the agrarian structure inherited from the past.

We begin with two empirical observations. First, small farms tend to be more productive than large farms.[9] Second, owner-cultivated plots of land

[9]This inverse farm-size productivity relationship is widely documented. See Banerjee (1999) for a review of the literature.

tend to be more productive than those under sharecropping tenancy (Shaban, 1987).

Frictions in the operation of land markets prevent market forces from getting rid of the inefficiency captured in these stylized facts and the implied productivity losses. In particular, the classic trade-off between rent-extraction and incentives that landlords face in a poor country where tenants are wealth-constrained ensures the persistence of such inefficiency in the land market. There are, of course, other instruments that the landlord might use to mitigate the loss of efficiency, such as interlinked credit and tenancy contracts (Braverman and Stiglitz, 1982), and eviction threats as an incentive device (Bardhan, 1984; Dutta, Ray, and Sengupta, 1989; Banerjee, Gertler, and Ghatak, 2002; Banerjee and Ghatak, 2004), but as long as the tenant does not have sufficient wealth to make fixed-rental contracts attractive to the landlord, the core inefficiency problem remains.

This forms the basis of the argument in favour of land reform intervention to redress this issue, from the point of both equity and efficiency considerations. Land reform serves the goal of equity by seeking to transfer property rights from the rich to the poor.[10] Land reform could also raise productivity by breaking (less productive) large farms into several (more productive) small farms - the motivation behind land ceiling legislation - as well as converting sharecroppers into owner-cultivators - the motivation behind tenancy reform. Indeed, by regulating aspects of the tenancy relationship, such as the crop share and security of tenure, tenancy reform increases the bargaining power of tenants vis-à-vis landowners and reduces the ability of landowners to extract rents, thereby raising efficiency.

Finally, the argument behind the remaining two types of land reform, i.e. abolition of intermediaries and consolidation of land was primarily to dimin-

[10]It is useful here to distinguish between land reform and tenancy reform. Land reform, in this context, would refer to an outright transfer of land from the landlord to the tenant, while tenancy reform regulates aspects of the tenancy relationship as described above. Clearly, land reform, if properly implemented, gets rid of the agency costs mentioned above. However, to the extent that there are imperfections in the market for other inputs, such as credit, the gains in productivity will be limited. Also, radical land reforms are politically difficult to implement. Other than political difficulties, there is a basic constraint in an extremely land-scarce country such as India. As Sharma (1994) shows, even if land ceilings are fully implemented and all the surplus land is redistributed to the landless, such an exercise will lead to extremely small holdings. This will not make much of a difference to poverty, and is likely to affect productivity adversely. Sharma's suggestion is that focusing attention on rigorously implementing tenancy reform, along the lines of West Bengal, might be a better option.

ish the inefficiency associated with an intermediary class for the former and improving efficiency of production by consolidating disparate landholding for the latter.

3.4 Effects of Land Reform in India

3.4.1 Agricultural Productivity

In this section, we empirically examine the relationship between land reform and agricultural productivity in India. As discussed above, by regulating rents and tenurial security, reducing power of intermediaries, imposing ceiling on landed property and consolidating disparate land holdings, land reform may be argued to impact agricultural performance. However, the key methodological problem faced by researchers whilst evaluating the impact of land reform is to find out a source of "exogenous" variation for the same.

Clearly, at the all-India level, it is impossible to determine the effect of land reform separately from the effect of all other economic and policy variables, given that they all vary over time. As a result, researchers have tried to exploit variation in the execution of land reforms across states, or across districts within a state, over time. This has the advantage of controlling for state (or district) fixed effects and year fixed effects. Thus, to the extent that time-invariant state (or district) specific factors (e.g. land inequality) drive the extent of these reforms, controlling for state (or district) fixed effects enables the separation of the effect of reforms from the direct effects of such factors. Analogously, to the extent that macro-shocks that apply to all states (or districts) affect the outcome variables of interest, controlling for year fixed effects ensures that the land reform measure is not picking up the effects of these other common time-varying factors.

An obvious limitation of this approach is that there could still be other policies and economic trends that vary over time and across states (or districts) and, to the extent that the land reform is correlated with these, the effect of some of these factors will be picked up by the land reform measures. Moreover, there is the question of endogeneity: factors that affect the success of land reform are also likely to affect productivity. For example, if a left-wing administration comes to power, as happened in Kerala and West Bengal, it will implement land reforms more actively and also implement other reforms (e.g. empowering local governments) that might have a direct effect on pro-

ductivity. The challenge in both cases is to isolate the effects of land reforms, and to understand the mechanism of how they operated.

3.4.1.1 Using Cross-State Variation

Effect of the Aggregated Measure of Land Reform

Besley and Burgess (2000) use state-level data for the 16 major Indian states from 1961 to 1992 and exploit the variation across states and over time in land reform legislation to identify the effect of land reform on poverty and agricultural productivity. As mentioned earlier, the 1949 Constitution of India left the adoption and implementation of land reforms to state governments, which led to much variation in the execution of these reforms across states over time. BB exploit this fact to identify the effect of land reform on poverty and growth in India.

They generate a cumulative variable that aggregates the number of legislative reforms passed by any particular state to date within each category of reform. They argue that, though crude, this measure provides a sensible first pass at analyzing the quantitative effects of land reform.

Formally, their approach is to run state-level panel data regressions using the following specification:

$$y_{st} = \alpha_s + \beta_t + \gamma x_{st} + \phi l_{s,t-4} + \epsilon_{st} \tag{3.1}$$

where y_{st} is the outcome variable of interest of state s in year t. α_s is a state fixed effect, β_t is a year dummy variable, x_{st} is a vector of exogenous controls that vary by state and year, $l_{s,t-4}$ is the stock of cumulative land reform measures lagged by 4 years[11], and ϵ_{st} is an error term modeled as an AR(1) process where the degree of autocorrelation is state-specific, i.e. $\epsilon_{st} = \rho_s \epsilon_{st-1} + u_{st}$. Additionally, their use of generalized least-squares estimation

[11]The 4-year lag is based on the reasonable assumption that the effect of legislative reform on productivity or poverty will not be instantaneous, owing to implementation and adjustment lags. Also, lagging the land reform variable may also address concerns that shocks to the outcome variables may be correlated with land reforms. BB point out that their results are not sensitive to the exact lag specification chosen, hence we stick to the 4 year lag as well. BB further deal with the potential endogeneity problem by instrumenting for land reform using lagged political variables reflecting the seat share of different political groups. However, BB do this only for their poverty results, and obtain results that are consistent with their GLS ones. Their productivity regressions are estimated using GLS, and therefore, so are ours. In fact, since within states, the residuals from regressions using annual agricultural data are strongly autocorrelated, using GLS rather than OLS can potentially increase efficiency (Duflo and Pande, 2007).

allows for heteroscedasticity in the error structure with each state having its own error variance.

Controlling for state and year fixed effects, and a number of time-varying economic and policy variables, they find that the lagged version of their cumulative land reform variable has a negative and significant effect on poverty. They do not report the effect of this cumulative aggregate land reform variable on agricultural productivity in their paper. Using the BB dataset, we re-ran regression equation 3.1 with log of agricultural yield as the dependent variable and find the effect of the cumulative land reform measure to be significantly negative (Table 3.1, column 1).[12]

These findings are quite interesting in the light of the discussion in the previous section. Firstly, they run contrary to the general impression that land reform in India did not have any significant impact overall, based primarily on how little land area it directly affected and also because of poor implementation. Secondly, they seem to suggest an equity-efficiency trade-off, contrary to the stated goal of the reform that it would achieve both equity and efficiency, and not one at the expense of the other. However, without looking at the specific components of land reform, to which we turn in the following section, it is hard to make a judgement from this as to what is driving this overall negative effect.

We also checked the robustness of these findings concerning the effect of land reform legislation on agricultural productivity, using an alternative agricultural yield measure. The yield measure that BB use is the ratio of real state domestic agricultural product to net sown area. However, the net state domestic agricultural product includes not only crops but livestock as well (Birthal and Rao, 2002). The latter is unlikely to be affected by land reform legislation, and hence may introduce measurement error in the yield variable, which might decrease the precision of the estimates. Moreover, if states with a larger share of livestock economy are more or less likely to pass land reform, and the share of the livestock economy changes over time, the estimates may be biased as well.[13] Therefore, we used an alternative yield measure obtained

[12]In all our regressions, we continue to use the GLS specification with state-specific error variance in order to maintain parity with BB.

[13]The concern regarding endogeneity of land reform is addressed in BB by instrumenting for land reforms using lagged political variables in the context of their poverty analysis, but not for their agricultural productivity analysis. We checked the BB productivity results using the same instruments for land reform and find that the GLS results for BB yield reported in Table 3.1 continue to hold (not reported). We return to the issue of endogeneity of land reforms later in this chapter.

Table 3.1: Aggregated and Disaggregated Impact of Land Reform on Agricultural Productivity

	Log of agri yield (BB)		Log of agri yield (IACD)		Log of rice yield (MoA)	
	Agg	Disagg	Agg	Disagg	Agg	Disagg
	(1)	(2)	(3)	(4)	(5)	(6)
4-yr lagged cumulative land reform	-0.01**		-0.02**		-0.02***	
	(0.01)		(0.01)		(0.01)	
4-yr lagged cumulative tenancy reform		-0.03***		0.01		0.01
		(0.01)		(0.01)		(0.01)
4-yr lagged cumulative abolition of intermediaries		-0.03		0.03		-0.01
		(0.02)		(0.03)		(0.02)
4-yr lagged cumulative land ceiling legislation		-0.02		-0.09***		-0.09***
		(0.02)		(0.02)		(0.02)
4-yr lagged cumulative land consolidation legislation		0.07***		-0.09***		-0.02
		(0.02)		(0.03)		(0.03)
No. of observations	495	495	402	402	512	512
State Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES

Notes: Standard errors are in parentheses. * denotes significant at 10 percent level, ** denotes significant at 5 percent level, *** denotes significant at 1 percent level. The BB series (obtained from Besley and Burgess, 2000) measures agricultural yield as the ratio of real agricultural state domestic product to net sown area, for 16 major states of India for 1961-92. The IACD series (obtained from Duflo and Pande, 2007) measures agricultural yield of six major crops of India, i.e. rice, wheat, jowar, bajra, sugarcane and maize, for 13 major states of India (Jammu and Kashmir, Assam and Kerala are dropped) for 1961-92. The MoA series (constructed by the authors using data from the Ministry of Agriculture, Govt. of India) provides rice yields, again for 16 major states of India for 1961-92. The sample sizes are different owing to missing observation (refer to text for details). GLS AR(1) model is used.

from the India Agricultural and Climate Dataset (IACD) that was assembled by Evenson and McKinsey.[14] This dataset covers six major crops of India - namely, rice, wheat, jowar, bajra, maize, and sugarcane[15] - which are used to calculate average agricultural yield for 13 major states of India.[16] In Table 3.1, column 3, we present the results using this alternative yield measure. The results are very similar to that obtained with BB yield measure - there exists a negative and significant effect of cumulative land reform legislation on agricultural productivity.

In order to address concerns that land reform may be proxying for other policies that are correlated with agricultural productivity, we control for a number of policy variables using both yield measures. The policy controls used here are same as the ones BB use, i.e. population growth rate, lagged log of agricultural yields, lagged per capita health expenditures, lagged per capita eduation expenditures, lagged per capita other expenditures, lagged per capita redistributive taxes, lagged state taxes as percentage of state domestic product etc.[17] Columns 1 and 3 in Table 3.2 present the results. The effects on BB yield is unchanged while that on IACD yield is somewhat muted (and equal to the BB effect) but still significant.

Effect of Disaggregated Measures of Land Reform

In order to obtain a more disaggregated picture of the impact of land reform, we now turn to the individual components of land reform. BB find that

[14]The original dataset covered the years 1961-87, and was later updated to 1999 by Duflo and Pande (2007) for their paper. We use the updated version, upto 1992. This dataset has also been used by Banerjee and Iyer (2005).

[15]These 6 crops together account for around 70% of total cropped area in India (Ministry of Agriculture, Govt. of India `www.indiastat.com`).

[16]The states that are dropped include Assam, Jammu and Kashmir, and Kerala.

[17]It should be pointed out that most of these policy variables relate to BB's analysis of the impact of land reform on poverty, which they have continued to use for their productivity results using agricultural yields in Table VIII, column 5 of their paper. In order to maintain parity with the BB specification, we use the same policy variables as BB in our analysis, although we do not expect health and education expenditures to directly affect agricultural yield, unless one makes a complicated argument that healthier farmers are more productive etc. On the other hand, there could be other omitted policy concerns that could have enhanced agricultural productivity and are correlated with land reform. An important example would be technological change in the form of the Green Revolution, which introduced High-Yielding Varieties (HYV) of crops, along with fertilizers and irrigation, in India and resulted in significantly increasing average yields of foodgrains (Rud, 2009). The inclusion of lagged log of agricultural yields, as in BB, address this concern to some extent, but correlation between such lagged dependent variables and the error term could still introduce bias in the estimates. However, lack of sufficient data on HYV coverage, fertilizer use and irrigation for the period 1961-92 prevents us from controlling for the Green Revolution and related programs explicitly.

Table 3.2: Aggregated and Disaggregated Impact of Land Reform on Productivity: Controlling for Omitted Policies

	Log of agri yield (BB)		Log of agri yield (IACD)		Log of rice yield (MoA)	
	Agg	Disagg	Agg	Disagg	Agg	Disagg
	(1)	(2)	(3)	(4)	(5)	(6)
4-yr lagged cumulative land reform	-0.01**		-0.01*		-0.01	
	(0.01)		(0.01)		(0.01)	
4-yr lagged cumulative tenancy reform		-0.03**		0.02*		0.02
		(0.01)		(0.01)		(0.02)
4-yr lagged cumulative abolition of intermediaries		-0.04		0.06*		0.10***
		(0.02)		(0.04)		(0.03)
4-yr lagged cumulative land ceiling legislation		-0.03		-0.10***		-0.12***
		(0.02)		(0.03)		(0.02)
4-yr lagged cumulative land consolidation legislation		0.07**		-0.07**		-0.03
		(0.03)		(0.03)		(0.04)
Population growth rate	1.98	1.36	9.69*	9.37*	10.84**	19.42***
	(3.19)	(3.17)	(5.37)	(4.82)	(4.75)	(4.55)
4-yr lagged per capita education expenditures	0.00	0.00	0.00	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
4-yr lagged per capita health expenditures	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
4-yr lagged per capita other expenditures	0.00	-0.00	0.00	0.00	-0.00	-0.00**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
4-yr lagged per capita tax revenue from	-0.00	-0.00	-0.01*	-0.01*	-0.00	-0.00
redistributive taxes	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
4-yr lagged state taxes as % of state	-0.35	-0.28	1.52	-0.09	2.44**	0.56
domestic product	(0.84)	(0.84)	(1.18)	(1.23)	(0.96)	(0.98)
4-yr lagged log of agricultural yield	0.01	-0.01				
	(0.05)	(0.06)				
4-yr lagged log of agricultural yield			-0.01	-0.09		
			(0.06)	(0.06)		
4-yr lagged log of rice yield					0.07	0.03
					(0.05)	(0.05)
No. of observations	424	424	335	335	424	424
State Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES

Notes: Standard errors are in parentheses. * denotes significant at 10 percent level, ** denotes significant at 5 percent level, *** denotes significant at 1 percent level. Following BB, state income per capita is obtained by expressing estimates of state domestic product in real per capita terms. Redistributive taxes are agricultural income taxes, land taxes and property taxes. Other expenditures is total expenditures excluding health and education. GLS AR(1) model is used.

tenancy reform had a negative and significant effect on agricultural productivity in India while land consolidation had a positive and significant effect. The other two measures - namely, abolition of intermediaries and land ceiling - had no statistically significant effect on productivity. From this, the authors conclude that land reforms did not have much effect on the distribution of land and seem to have operated mainly through altering the contractual relations in agriculture.

Using the alternative IACD yield measure, we find that the results of these disaggregated components of land reform change rather significantly. Columns 2 and 4 of Table 3.1 present the results with both the yield variables. In contrast to BB[18], we find the impacts of tenancy reform and abolition of intermediaries to be positive, although insignificant, for the IACD yield variables. Land ceiling and land consolidation legislations, on the other hand, have negative and significant effects on the IACD yield, again in contrast to BB.[19]

The observed insignificant average impact of tenancy reform on productivity in our analysis could be due to several reasons. First, it could be that tenancy laws were not rigorously implemented in most states. Second, it could due to the fact that the positive direct effects on tenant incentives are cancelled out by the negative indirect effects on the rural land-lease market that may reduce tenancy share. We will further examine this line of argument later in the chapter using evidence from West Bengal, a state where the tenancy reform laws are believed to have been rigorously implemented (Sengupta, 1981). We will also look at the effect of various components of land reform on the distribution of land in section 3.4.2, in an attempt to explore the nature of the aforementioned indirect effects.

The significantly negative effect of land ceiling legislation on productivity, on the other hand, is likely to be capturing the effect of fragmentation of holdings resulting from such ceilings. Indeed, in the case of Kerala, which has been among the leading states in implementing land reforms in India, it is generally acknowledged that land reform has led to extreme fragmentation of land and resulted in making agriculture a low-profit venture in the state (Krishnakumar, 2004).

The negative impact of land consolidation legislation may be explained by

[18]When we replicate the BB regressions (Table 3.1 column 2) our coefficients, though very close, are not exactly identical to those reported in BB Table VIII. This seems to be due to some missing values in our version of the BB estimation.

[19]As noted by BB, we also assume that the effects of each category of land reform work independently of one another.

the fact that owing to poor implementation, land holdings of very different quality were often merged together that could have resulted in reduced overall productivity.

Controlling for economic and other policy variables following BB in Table 3.2, however, we find in column 4 that the effects of tenancy laws and abolition of intermediaries are now significant at 10% level, and somewhat larger in magnitude. In other words, regulation of tenancy contracts and bringing the peasants in direct contact with the government served to improve combined agricultural productivity of the 6 major crops of India. Hence, our results seem to suggest that the negative overall effect of land reform on agricultural productivity is primarily being driven by land ceiling and land consolidation legislations, and not tenancy reform as suggested by BB.

3.4.1.2 Using Within-State Variation: West Bengal

BB take land reform *legislation* as the measure of land reform, and not its *implementation*. Given the widely acknowledged gap between the two, one concern is that a poorly implemented land reform legislation could have negative indirect effects that could outweigh the positive direct effects. For example, an ill-enforced tenancy reform may have a net negative effect on productivity by freezing up the land-lease market, even though it might improve the productivity as well as the income of the tenants it directly affects. This highlights the need to take into consideration the implementation aspect of land reform in order to gain a complete picture regarding its effects. We return to some of these unintended consequences of land reform below, in particular in the context of distribution of land.

In this context, the contribution of Banerjee, Gertler, and Ghatak (2002) is noteworthy. As mentioned earlier, BGG find that in West Bengal, a state where tenancy reforms were implemented very thoroughly, tenancy reforms improved productivity of rice significantly.[20] Using a difference-in-difference approach, they compare the growth in productivity in West Bengal districts

[20]Within a year of being elected in 1977, the left-wing administration in West Bengal launched Operation Barga, a programme designed to implement and enforce the long-dormant agricultural tenancy laws that regulated rents and security of tenure of share-croppers. Under these laws, if tenants registered with the Department of Land Revenue of the state government, they would be entitled to permanent and inheritable tenure on the land they sharecropped, as long as they paid the landlord at least 25 per cent of output as rent. In the decade following the launch of Operation Barga, there was a significant improvement in tenurial contracts and security of tenure.

with that in the districts of the neighbouring country of Bangladesh before and after the reform,[21] and find that the rate of growth in rice productivity was higher in West Bengal compared to Bangladesh.[22]

In order to alleviate concerns that tenancy reforms could be correlated with other contamporaneous policy reforms being undertaken in West Bengal, BGG also exploit inter-district variations generated by bureaucratic frictions in the rate of implementation of this reform (captured by the fraction of sharecroppers who were registered under this programme) as exogenous changes in the availability of a new contractual regime to identify the effect of the reform on productivity. This approach yields similar results regarding the effect of tenancy reform as the first one, suggesting that tenancy reform did have a positive effect on rice productivity in West Bengal.

Hence, from BGG it is clear that the well-implemented tenancy reforms in West Bengal had a direct positive effect on tenants who were directly affected by it, but the indirect effects of the reform on the rural land market and thereby on productivity, both in West Bengal and elsewhere, are less clear. We return to this issue in later in the chapter.

3.4.1.3 West Bengal compared to Rest of India

In an attempt to place the findings of BGG in the broader all-India context, we now examine how different the experience of West Bengal was in the cross-state analysis of BB. For this purpose, we first re-ran the BB regressions with rice yield measures as the dependent variable[23] to see if the effect of land reform on general agricultural productivity also hold for rice. In Table 3.1, columns 5 and 6 present the results without controls, and in Table 3.2, the corresponding columns present the results with the time-varying economic and policy

[21] BGG argue that except for religion and political boundaries, the two regions are very similar in most respects, including agro-climatic conditions, prevalence of tenancy, agricultural technology, etc. such that one might expect technological shocks to agricultural yields to be similar between these two regions. Indeed, during this period agricultural productivity in both regions (and much of eastern India) grew in part owing to the belated arrival of the Green Revolution heralded by the adoption of a locally suited high-yield variety (HYV) of rice, a fall in the price of fertilizers, and an increase in small-scale private irrigation.

[22] A concern regarding BGG's results has been that the data-collection methodology relating to agricultural production underwent some changes under the new administration that could have inflated West Bengal's growth performance relative to Bangladesh. This issue has been addressed in a separate study where the official rice yield data used by BGG is augmented with new data released in this context (BAES, 2002) and the BGG results are revisited in an attempt to check if they are robust to the inclusion of such new data.

[23] The data on rice yields was obtained by the authors from Ministry of Agriculture records.

controls. In the absence of controls, the aggregate measure of land reform continues to have a negative and significant effect on rice productivity, and is equal to the IACD coefficient in magnitude. For the individual components of land reform, too, the results are very similar to those obtained for the IACD yield measure: i.e., tenancy reform has a positive but insignificant effect, while land-ceiling legislation has a negative and significant effect. The only major difference with the IACD yield measure is that the effect of land consolidation legislation is no longer statistically significant, and land ceiling appears to be the only driver of the negative overall effect of land reform on rice productivity.

With controls, the effect of aggregate land reform on is no longer significant, suggesting that cumulative aggregate land reform legislation had negligible impact on productivity of rice during this period, which is different from what we obtained both for the BB and IACD yield measures. For land reforms disaggregated by type, the picture is quite similar to that obtained for IACD yield, except for the fact that the estimated effects of tenancy reforms and land consolidation are no longer statistically significant (although the former coefficient is exactly equal to the IACD coefficient in column 4).

Next, to disentangle the experience of West Bengal in this analysis, we ran the BB regressions allowing for an interaction between a dummy variable for West Bengal and the cumulative land reform variable in order to identify the marginal effect of land reform in West Bengal. Table 3.3 presents the results. We find that for both the BB yield and rice yield, the marginal effect of land reform in West Bengal was significantly different from that in the rest of India in a positive direction (columns 1 and 5 respectively). For the IACD yield, the marginal effect is positive but insignificant (columns 3). This may be due to the fact that the IACD series has missing observations for West Bengal for the period 1988-92 that may have muted the effect. The average effect of land reform for West Bengal is positive and insignificant using the BB and the rice yield measure, and negative and insignificant using the IACD measure. Controlling for the usual array of economic and policy variables yields similar results (columns 2, 4 and 6).

In summary, we find that in India, on average, land-reform legislation has had a negative and significant impact on agricultural productivity, but this appears not to be the case for West Bengal. The reason behind this is likely to be a combination of two factors. Firstly, during the period under study, tenancy reform and not land ceiling legislation was the key source of variation in the land reform variable in the case of West Bengal relative to other states

Table 3.3: Effect of Aggregate Land Reform in West Bengal compared to Rest of India

	Log of agri yield (BB)		Log of agri yield (IACD)		Log of rice yield (MoA)	
	(1)	(2)	(3)	(4)	(5)	(6)
4-yr lagged cumulative land reform	-0.03***	-0.03***	-0.03***	-0.02**	-0.03***	-0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
West Bengal*4-yr lagged cumulative land reform	0.03***	0.03***	0.01	0.01	0.02**	0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Population growth rate		-0.01		8.72		5.83
		(3.13)		(5.40)		(5.05)
4-yr lagged per capita education expenditures		0.00		0.00		-0.00
		(0.00)		(0.00)		(0.00)
4-yr lagged per capita health expenditures		-0.00		-0.00		-0.00
		(0.00)		(0.00)		(0.00)
4-yr lagged per capita other expenditures		-0.00		0.00		-0.00
		(0.00)		(0.00)		(0.00)
4-yr lagged per capita tax revenue from		-0.00*		-0.01*		-0.00
redistributive taxes		(0.00)		(0.00)		(0.00)
4-yr lagged state taxes as a % of state		-0.12		1.64		2.79***
domestic product		(0.81)		(1.17)		(0.95)
4-yr lagged log of agricultural yield		0.00				
		(0.05)				
4-yr lagged log of agricultural yield				-0.01		
				(0.06)		
4-yr lagged log of rice yield						0.06
						(0.05)
No. of observations	495	424	402	335	512	424
State Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES

Notes: Standard errors are in parentheses. * denotes significant at 10 percent level, ** denotes significant at 5 percent level, *** denotes significant at 1 percent level. The interacted variable above is obtained by interacting a dummy that takes on the value 1 if the state is West Bengal with the four year lagged cumulative land reform variable constructed as in BB. GLS AR(1) model is used.

(see BB, Table II), and as we have seen from Tables 3.1 and 3.2, tenancy reform is associated with a positive (although sometimes insignificant) effect on productivity. Secondly, tenancy laws were implemented thoroughly in West Bengal, which helped bypass the potentially negative effects arising from efforts to evade the law that could shortcircuit the process, and ensured that the benefits of tenancy reforms were well reaped.

3.4.1.4 Heterogenous Effects across States

Our analysis therefore suggests that some states performed better than others in the context of land reform, but this heterogeneity of experience might be lost when the impact is analyzed at the aggregate level. Indeed, this comes out clearly if we allow for state-specific slopes in the land reform variable in the estimating equation 3.1, and the results are reported in Table 3.4.

Controlling for the usual factors, we find considerable heterogeneity for all three yield measures: 9 out of a total of 16 states in columns 2 and 6 and 6 out of the 13 states in column 4 experienced significant effects (at the 1-10 percent level) of cumulative aggregate land reform. In column 2, 8 of these states had a negative effect and only 1 had a positive effect. In column 4, 5 had a negative effect and 1 had a positive effect. In column 6, 5 had a negative and 4 had a positive effect.

However, it is challenging to infer from this dataset what drives such heterogeneity. One potential explanation could be differential emphasis put on different components of land reform by different states. As is apparent from Table 3.5, not all states pass equal number of legislations in each category of land reform.

Some states like Bihar, Gujarat, Kerala, Punjab, Tamil Nadu and West Bengal passed more tenancy reforms while others like Rajasthan passed more reforms related to abolition of intermediaries. The table also indicates that tenancy laws and land ceiling legislations were the most common reforms passed by states (52% and 26% respectively), hence we focus on these two types of land reform. As Tables 3.1 and 3.2 show, tenancy laws and land ceiling legislations have very different effects on productivity. Ceiling has a strong negative effect while tenancy has a marginal positive effect.[24] Thus, depending on which state lays emphasis on what type of land reform, the state-wise impact

[24]The emphasis laid on tenancy law is also bolstered by the findings in the existing literature, in particular, BGG that confirm the positive association between tenancy reform and productivity.

Table 3.4: Different State-specific Slopes w.r.t Aggregate Effect of Land Reform on Yield

	Log of agri yield (BB)		Log of agri yield (IACD)		Log of rice yield (MoA)	
	(1)	(2)	(3)	(4)	(5)	(6)
Andhra Pradesh*4-yr lagged CLR	0.02	0.02	0.05	0.05	0.10*	0.10*
	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.06)
Assam*4-yr lagged CLR	-0.08***	-0.09***	-	-	-0.09***	-0.09***
	(0.02)	(0.02)			(0.03)	(0.03)
Bihar*4-yr lagged CLR	0.02	0.03	-0.08***	-0.09***	-0.06***	-0.07***
	(0.01)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
Gujarat*4-yr lagged CLR	0.05**	0.06	0.04	0.06	0.02	0.15***
	(0.03)	(0.04)	(0.05)	(0.08)	(0.04)	(0.05)
Jammu and Kashmir*4-yr lagged CLR	0.04	-0.01	-	-	0.08	-0.04
	(0.04)	(0.06)			(0.07)	(0.07)
Karnataka*4-yr lagged CLR	-0.03**	-0.04*	-0.02	-0.04	-0.02	-0.04
	(0.01)	(0.02)	(0.03)	(0.05)	(0.02)	(0.03)
Kerala*4-yr lagged CLR	-0.03***	-0.04***	-	-	-0.02***	-0.01
	(0.01)	(0.01)			(0.01)	(0.01)
Madhya Pradesh*4-yr lagged CLR	-0.05**	-0.48***	-0.05*	-0.21***	-0.07*	-0.22***
	(0.02)	(0.03)	(0.03)	(0.02)	(0.04)	(0.02)
Maharashtra*4-yr lagged CLR	-0.04	-0.70***	-0.02	-0.34***	-0.11	-0.05
	(0.06)	(0.04)	(0.07)	(0.04)	(0.07)	(0.03)
Orissa*4-yr lagged CLR	-0.02*	-0.02*	-0.04***	-0.03***	-0.03**	-0.02*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Punjab*4-yr lagged CLR	0.10***	0.08*	0.17***	0.07	0.34***	0.26***
	(0.04)	(0.04)	(0.06)	(0.05)	(0.09)	(0.06)
Rajasthan*4-yr lagged CLR	-0.09	-1.64***	-0.17	-1.19***	-0.23	-0.54***
	(0.08)	(0.09)	(0.21)	(0.10)	(0.24)	(0.09)
Tamil Nadu*4-yr lagged CLR	-0.05***	-0.05***	0.00	0.01	0.01	0.02
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)
Uttar Pradesh*4-yr lagged CLR	-0.01	-0.01	0.02	0.06**	0.08***	0.15***
	(0.01)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
West Bengal*4-yr lagged CLR	0.00	0.00	-0.01	-0.01	-0.00	-0.00
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
No. of observations	495	424	402	335	512	424
BB Controls	NO	YES	NO	YES	NO	YES
State Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES

Notes: Standard errors are in parentheses. * denotes significant at 10 percent level, ** denotes significant at 5 percent level, *** denotes significant at 1 percent level. CLR denotes cumulative land reform legislation variable as constructed in BB. Haryana's interaction with the lagged cumulative land reform dummy is dropped as Haryana had no such legislation during this period. BB controls include population growth rate, lagged log of agricultural yields, lagged per capita health expenditures, lagged per capita education expenditures, lagged per capita other expenditures, lagged per capita redistributive taxes, lagged state taxes as percentage of state domestic product. GLS AR(1) model is used.

Table 3.5: Number of Different Types of Land Reform passed by States 1961-92

State	Tenancy	Abolition	Ceiling	Consolidation	All
Andhra Pradesh	1	1	0	0	2
Assam	1	0	1	1	3
Bihar	4	0	3	0	7
Gujarat	2	1	1	0	4
Jammu and Kashmir	1	0	0	1	2
Karnataka	2	0	2	0	4
Kerala	4	3	2	0	9
Madhya Pradesh	1	0	1	1	3
Maharashtra	1	0	1	0	2
Orissa	3	1	3	1	8
Punjab	1	0	0	0	1
Rajasthan	0	1	0	0	1
Tamil Nadu	6	0	1	0	7
Uttar Pradesh	2	2	1	0	5
West Bengal	9	0	3	3	15
Total	38	9	19	7	73

Notes: Haryana is exluded as no land reform legislation was passed in that state during this period.

on productivity also ought to vary.

To examine this line of argument further, we construct a measure of the relative importance of ceiling laws to tenancy laws passed in each state. The measure comprises of the ratio of total number of cumulative land ceiling laws to total number of cumulative tenancy laws passed in each state to date, weighted by the state's share of the total number of land reforms passed in the country to date.

Figure 3.1 plots the IACD agricultural yield measure against the ceiling-tenancy ratio for 1987 while Figure 3.2 plots the rice yield measure against ceiling-tenancy ratio for 1992.[25] Both graphs seem to suggest an inverse relationship between relative predominance of ceiling laws and productivity.[26]

To formalize the analysis, we regress all three productivity measures on the ceiling-tenancy ratio lagged 4 years, using GLS and an error term modelled as a AR(1) process. The results are presented in Table 3.6, and we find that the lagged ceiling-tenancy ratio is negatively correlated with all three productivity measures, implying that states that pass more ceiling laws compared to tenancy laws perform worse in terms of productivity. The results do not change

[25]Although the last year of our sample period is 1992, Bihar, Orissa and West Bengal have missing observations with regard to IACD agricultural yield for 1988-92. Hence Figure 3.1 plots the relationship between yield and ceiling-tenancy ratio for 1987. Rice yields are available for the full sample period, hence Figure 3.2 is plotted for 1992.

[26]The relationship between ceiling-tenancy ratio and BB yield measure is quite flat.

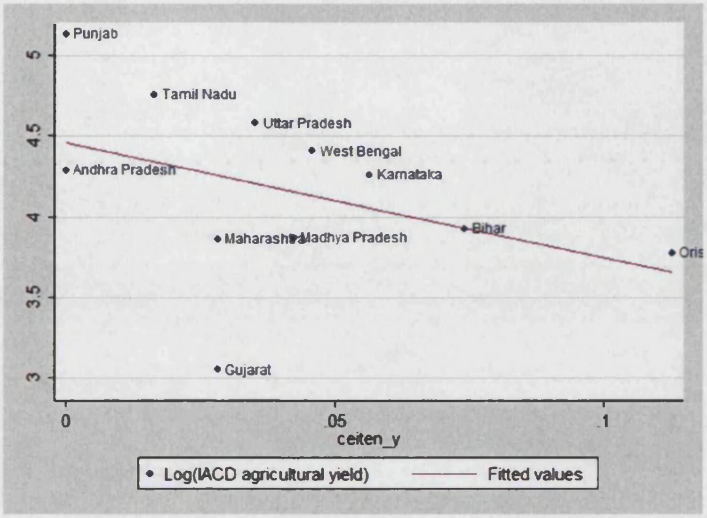

Figure 3.1: Log of IACD Agricultural Yield and Ceiling-Tenancy Ratio

substantially when we introduce the usual array of controls following BB.

However, as BB point out, it is important to recognize that land reform could be potentially endogenous. The same forces that lead states to pass more or less ceiling laws compared to tenancy laws may also be correlated with productivity. For example, areas that were historically under landlord dominated land revenue systems have been shown to have lower productivity (Banerjee and Iyer, 2005) and may also be more likely to pass a greater number of ceiling laws relative to tenancy laws, compared to non-landlord dominated areas.[27] This concern regarding potential endogeneity is present in

[27]Based on mean proportion of districts in each state under landlord system of revenue collection during the British colonial times, Banerjee and Iyer (2005) classify Bihar, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and West Bengal as "landlord" states, and Andhra Pradesh, Assam, Gujarat, Karnataka, Kerala, Maharashtra, Punjab and Tamil Nadu as "non-landlord states". Using this classification in the BB dataset, we find that the landlord states have a higher ceiling-tenancy ratio on average compared to the non-landlord states. In particular, all non-landlord states (with the exception of Karnataka) have a mean ceiling-tenancy ratio less than or equal to 0.05 while all landlord states (with the exception of West Bengal) have a mean ceiling-tenancy ratio greater than or equal to 0.06. A potential reason behind such a pattern might have to do with the relative ease of evasion of these laws even after their enactment. In particular, land ceiling legislation stipulated that land owned in excess of a fixed amount would be taken away for redistribution. But this ceiling was fixed per person, thereby leaving a lot of scope for illegal transfers to family members (known as *benaami* transactions) to evade the law. Additionally, the land leased out by the landowner was not taken into account in fixing the ceiling area (Sharma, 1999). This made ceiling laws easier to evade as compared to tenancy laws, where the rules were more transparent and not particularly in favour of the landlords. Anticipating this, states that have been historically dominated by landlord class may be more prone to pass land ceiling laws compared to tenancy reforms.

Table 3.6: Cumulative Ceiling to Tenancy Laws Ratio and Agricultural Productivity

	Log of agri yield (BB)		Log of agri yield (IACD)		Log of rice yield (MoA)	
	(1)	(2)	(3)	(4)	(5)	(6)
4-yr lagged cumulative ceiling/tenancy laws	-0.71**	-0.72**	-1.65***	-1.55***	-1.00***	-1.42***
	(0.30)	(0.35)	(0.43)	(0.50)	(0.37)	(0.45)
Population growth rate		-0.61		4.87		5.94
		(3.78)		(6.04)		(5.08)
4-yr lagged per capita education expenditures		-0.00		0.00		0.00
		(0.00)		(0.00)		(0.00)
4-yr lagged per capita health expenditures		-0.00		0.00		-0.00
		(0.00)		(0.00)		(0.00)
4-yr lagged per capita other expenditures		0.00		0.00		-0.00***
		(0.00)		(0.00)		(0.00)
4-yr lagged per capita tax revenue from		-0.01**		-0.01		0.00
redistributive taxes		(0.00)		(0.01)		(0.00)
4-yr lagged state taxes as a % of state		-0.29		1.24		0.63
domestic product		(0.83)		(1.40)		(1.02)
4-yr lagged log of agricultural yield		0.01				
		(0.06)				
4-yr lagged log of agricultural yield				-0.10		
				(0.07)		
4-yr lagged log of rice yield						-0.01
						(0.06)
No. of observations	332	328	261	257	332	328
State Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES

Notes: Standard errors are in parentheses. * denotes significant at 10 percent level, ** denotes significant at 5 percent level, *** denotes significant at 1 percent level. The variable Ceiling/Tenancy captures the ratio of cumulative ceiling laws to cumulative tenancy laws passed in a state to date, weighted by the state's share of cumulative land reform legislation passed in India to date. GLS AR(1) model is used.

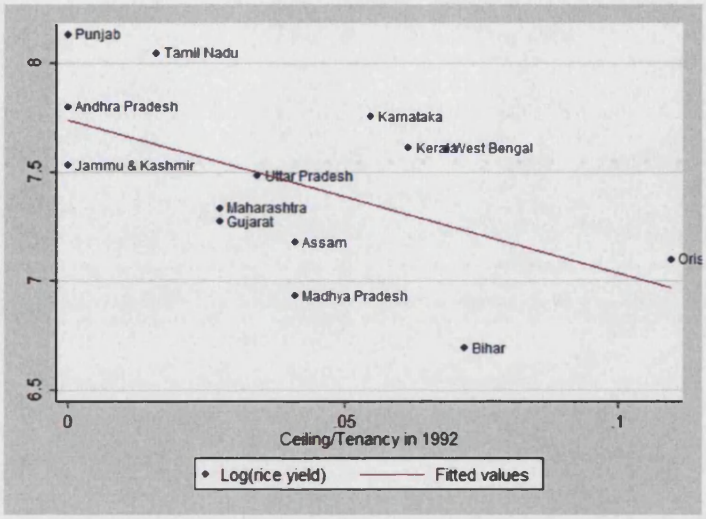

Figure 3.2: Log of Rice Yield and Ceiling-Tenancy Ratio

BB's poverty analysis as well. They address this problem by instrumenting for land reform using political variables that reflect the seat shares of different political parties at each state election. The reason behind this, as argued by BB, is that land reform is a political issue in India, with some political parties being more likely to pass land reform legislations at the state legislatures than others (owing primarily to differences in ideology). To mitigate the problem of contemporaneous shocks to the outcome variable affecting election results and thereby making the political variables endogenous, BB use political variables lagged by 8 years as instruments for land reform.

Following BB, therefore, we also instrument the cumulative ceiling-tenancy ratio using lagged seat shares of different political parties.[28]

This implies a first-stage equation for ceiling-tenancy ratio as follows:

$$ct_{st} = \mu l_{s,t-4} + a_s + b_t + cz_{s,t-4} + \eta_{st} \tag{3.2}$$

[28]The underlying assumption in case of the BB instruments is that contamporaneous shocks to poverty are uncorrelated to shocks that lead to particular groups being elected 8 years previously which, BB argue, makes sense given the frequency of elections in India during this period and policy shifts that were associated with them. However, the lingering concern is that elected political leaders from 8 years ago could have put in place policies other than land reform that continue to have a direct impact on current day poverty, in which case the exclusion restriction may be violated. This continues to be a concern for the instrumental variable regressions in this chapter as well. In case land reform was a part of a package of productivity-boosting policies undertaken by elected government, the exclusion restriction would be violated in our case as well. However, we wanted to keep our analysis as close to BB, hence we persist with their instruments.

where ct_{st} is the ratio of cumulative ceiling laws relative to tenancy laws till date, $l_{s,t-4}$ are the cumulative land reform variables lagged 4 years, a_s is a state fixed effect, b_t is a year dummy variable and the variables $z_{s,t-4}$ are the political variable i.e. seat shares of different political groups, each lagged by 4 years. BB construct these from records of the number of seats won by different national parties at each state election. There are four broad groupings - Congress Party, hard left parties that include CPI and CPM, soft left parties, Hindu parties.[29] BB express these as a share of total seats in the legislature. Instead of grouping CPI and CPM as hard left parties following BB, we include them separately in our analysis.

Column 1 of Table 3.7 shows the instrumental variables first stage. Lagged cumulative land ceiling legislation is strongly significant. Relative to the omitted "other parties" category (comprised of regional, independent and Janata parties), CPI decreases the probability of passing more ceiling laws relative to tenancy laws, while CPM increases the same. The rest of the parties are insignificantly different.

Columns 2-4 of Table 3.7 present the results from instrumental variables estimation, using the lagged political variables and lagged land reforms as instruments for current cumulative ceiling-tenancy ratio. We continue to find a negative and significant impact of ceiling-tenancy ratio on IACD agricultural yield and rice yield. The coefficient for BB yield is also negative, but insignificant.

An interesting point to note here is that the positive influence of the CPM party in passing more land ceiling laws compared to tenancy laws seems to be in apparent contradiction with our earlier discussion, where we argue that West Bengal, traditionally a CPM stronghold, experienced a positive marginal effect of land reform on agricultural productivity relative to the rest of India.[30] However, a closer look at the break-down of different land reform measures undertaken in West Bengal, as outlined in BB Table II of their paper, reveals that while the CPM government did pass the tenancy law in 1977 (right after their election), it also passed three land ceiling legislations during its rule -

[29]The parties included in each group are listed by BB as follows: (i) Congress Party (Indian National Congress+Indian Congress Socialist+Indian National Congress Urs+Indian National Congress Organization), (ii) a *hard left* grouping (Communist Party of India+Communist Party of India Marxist), (iii) a *soft left* grouping (Socialist Party+Praja Socialist Party) and (iv) Hindu parties (Bharatiya Janata Party+Bharatiya Jana Sangh).

[30]West Bengal is the only major state in India where the CPM has been in power for a prolonged period of time (1977-present). Kerala, the other major Marxist state, has had both CPI and CPM parties alternating in government.

Table 3.7: Cumulative Ceiling to Tenancy Laws Ratio and Agricultural Productivity: IV Results

	Cum. ceiling/tenancy till date	Log(agri yields)		Log(rice yields)
		BB	IACD	MoA
	1st Stage	IV	IV	IV
	(1)	(2)	(3)	(4)
4-yr lagged cumulative ceiling/tenancy laws		-0.54	-2.76***	-1.61***
		(0.44)	(0.76)	(0.60)
4-yr lagged cumulative tenancy reform	-0.00			
	(0.00)			
4-yr lagged cumulative abolition of intermediaries	0.00			
	(0.00)			
4-yr lagged cumulative land ceiling	0.03***			
	(0.00)			
4-yr lagged cumulative land consolidation	-0.00			
	(0.01)			
4-yr lagged Congress Party share of seats	-0.00			
	(0.00)			
4-yr lagged CPI Party share of seats	-0.08**			
	(0.04)			
4-yr lagged CPM Party share of seats	0.12***			
	(0.03)			
4-yr lagged soft left share of seats	0.02			
	(0.03)			
4-yr lagged Hindu parties share of seats	-0.02			
	(0.03)			
Overidentification test p-value	-	0.12	0.98	0.53
No. of observations	383	327	256	327
State Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES

Notes: Standard errors are in parentheses. * denotes significant at 10 percent level, ** denotes significant at 5 percent level, *** denotes significant at 1 percent level. Instruments for the endogenous policy variable (ratio of ceiling to tenancy laws passed lagged 4 periods) are share of seats in state assemby occupied by Congress, CPI, CPM, softleft and hindu parties lagged 8 periods plus land reform variables lagged 8 periods. Following BB, the overidentification test we employ is Sargan (1958). The null hypothesis being tested with the Sargan test is that the instrumental variables are uncorrelated to some set of residuals, and therefore they are acceptable, healthy, instruments.The number of observations times the R^2 from the regression of state 2 residuals on the instruments is distributed $\chi^2(T+1)$, where T is the number of instruments. All regressions are reported with robust standard errors.

in 1981, 1986 and 1990, which is what is probably being picked up in column 1 of Table 3.7 of this chapter. On the other hand, a number of tenancy reforms had already being put in place before the CPM government came into power in West Bengal, according to the BB Table II, such that the overall ceiling/tenancy ratio of West Bengal was actually low.

Moreover, the CPM-led tenancy law was very strictly enforced right after its enactment, which ensured that its benefits were also well reaped. However, in our analysis (as in BB), all land reform legislations are given equal weight, with no adjustments made on the degree of success achieved in *implementation* of the legislation. So, it may also be speculated that although the CPM government in West Bengal passed only one tenancy reform and three land ceiling reforms, the negative effect of the ceiling laws may have been overturned by the positive effect of well-implemented tenancy laws. However, it is difficult to identify such nuanced effects from the aggregate data used in this chapter. Micro-level studies may be more successful in disentangling these effects.

Thus, differences in intensity of implementation of land reforms could be another possible mechanism explaining the cross-state heterogeneity. While some states like West Bengal spearheaded the implementation of land reforms and ensured proper enforcement, others lagged behind, which might have introduced considerable heterogeneity across states in terms of impact. However, it is important to note that the analyses in BB, BGG and this chapter are based on aggregate data (state or district level) and to the extent that there are unintended and indirect effects of land reform that are driving the heterogeneity among states, it might be challenging to distinguish such effects from the direct ones at the aggregate level.[31]

[31] Micro-level studies can potentially shed light on this issue. A recent study by Bardhan and Mookherjee (2007) is noteworthy in this context. Using village-level data in West Bengal, they continue to find a significant impact of tenancy registration on rice yields - the effects are somewhat smaller compared to BGG, but of the same order of magnitude. However, they argue that the estimated positive impact of tenancy registration in West Bengal on yields is actually a part of broader village-wide general equilibrium effects of local governance implementing various agrarian reforms (including land reforms), rather than partial equilibrium effects of tenancy reforms alone through improved effort or investment incentives of farmers directly affected by the latter. For example, these could affect the prices of complementary inputs, such as credit or fertilizer, or the balance of political power and consequently how collective-action problems are resolved (see Bardhan and Mookherjee (2007) for a formal analysis of the latter effect).

3.4.2 Distribution of Land

This section makes an attempt to explore the indirect effects of land reform refered to earlier by looking at the impact on distribution of land in India. As noted above, tenancy reforms may have indirect effects in the form of reduced tenancy shares if poorly implemented.[32] Such a decline in the share of cultivated land under tenancy can come about in several ways. The first is under-reporting. The second is anticipatory eviction: in anticipation of the new tenancy legislation, landlords can evict tenants and cultivate the land using hired labour, or sell it off to a third party. Third, they can sell off the land to the erstwhile tenants. For the first case there ought to be no change in land ownership or operation[33]. In the second case, concentration of ownership may stay the same if the owner does not sell the land (or go up or down if he sells it, depending on whether the buyer is richer than him or not). However, concentration of operational holdings will certainly go up in this case. In the third case, concentration of ownership will go down and that of operational holdings will stay the same.

We use the following regression equation to find out empirically what happened to the concentration of ownership and operational holdings following land reform in India:

$$z_{st} = \alpha_s^{'} + \beta_t^{'} + \psi l_{s,t-4} + \epsilon_{st} \tag{3.3}$$

where z_{st} is land Gini (pertaining to ownership holdings and operational holdings), $\alpha_s^{'}$ is a state fixed effect, $\beta_t^{'}$ is a year dummy variable, $l_{s,t-4}$ is the cumulative stock of past land reforms lagged by 4 years, and ϵ_{st} is the error term. We use fixed-effects linear regression and ψ, which embodies the effect of land reform on the land Gini coefficient, is our primary coefficient of interest. In this entire analysis, we exclude households that do not own or operate any land.

The data on Gini coefficient of household ownership and operational land holding used in this section are obtained from various rounds of the Na-

[32]Conning and Robinson (2007) show that, despite having been designed to protect tenant rights, tenancy reforms that guaranteed security of tenure and stipulated rent actually ended up reducing the extent of reported tenancy in India.

[33]Household ownership holdings include all land owned or held in owner-like possession by households. Household operation holding, on the other hand, is defined as all land which is wholly or partly used for agriculture production and is operated as one technical unit, i.e. under same management and using same means of production, by one person alone or with others (Bakshi, 2008).

Table 3.8: Effect of Tenancy Reform on Land Gini Coefficient

	All States		All States excl West Bengal	
	(Gini Coefficient)		(Gini Coefficient)	
	Ownership	Operational	Ownership	Operational
	(1)	(2)	(3)	(4)
4-yr lagged cumulative tenancy reform	0.00	0.01	0.00	0.01**
	(0.00)	(0.01)	(0.00)	(0.01)
4-yr lagged cumulative abolition of intermediaries	-0.02	-0.03	-0.02	-0.02
	(0.01)	(0.02)	(0.01)	(0.02)
4-yr lagged cumulative land ceiling legislation	-0.00	-0.04*	-0.00	-0.04*
	(0.01)	(0.02)	(0.01)	(0.02)
4-yr lagged cumulative land consolidation legislation	-0.01	-0.01	-0.01	0.00
	(0.01)	(0.02)	(0.02)	(0.04)
No. of observations	45	45	42	42
State Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES

Notes: Standard errors are in parentheses. * denotes significant at 10 percent level, ** denotes significant at 5 percent level, *** denotes significant at 1 percent level. Fixed effects linear regression model is used.

tional Sample Survey (NSS) Reports, which are collated efficiently in Sharma (1994).[34] In keeping with our analysis in the previous section, we restrict our sample to begin from 1961, and use data for 1961, 1971, and 1982. Unfortunately, Sharma only reports data till 1982, and hence our sample set only covers the period 1961-82 instead of 1961-92 as in the previous sections. Hence our analysis is based on a very small sample and because estimating a two-way fixed effects regression demands a lot from such a small dataset, the results should be interpreted with caution and considered to be indicative and not conclusive regarding the impact of land reform on distribution of land in India.

The results of the regression are presented in Table 3.8. Columns 1 and 2 present the regression results for all 15 major Indian states except Haryana.[35] We find no significant impact of tenancy reform on either type of Gini coefficient, and even in magnitude, the coefficients are very small indeed.

Since West Bengal is one of the few states that implemented tenancy laws rigorously, we re-estimated equation 3.3 excluding West Bengal.[36] From columns 3 and 4, we see that tenancy reform had no significant effect on Gini coefficient for ownership land but significantly increased the Gini coefficient

[34]The Gini coefficients are calculated after excluding landless households and households not operating land respectively.

[35]Haryana is dropped owing to missing observations.

[36]Owing to the very small sample, we do not use the more standard method of interacting the reform dummies with the state dummies to capture the state-specific effects.

for operational land. This provides some suggestive, but far from conclusive, evidence that in anticipation of the new tenancy legislation, landlords could be engaging in eviction of tenants in states other than West Bengal where tenancy reform had been poorly implemented. This finding confirms anecdotal accounts of such eviction in several states of India (Appu, 1996). Another possibility could be that powerful landlords were forcing their tenants to declare themselves as wage labourers such that they could conceal the extent of tenancy on their land and escape the diktats of the tenancy law.

We also find that land ceiling legislation has a significantly negative impact on operational Gini, but no effect on ownership Gini, for both the regression with West Bengal and without. This could be taken as tentative support in favour of the hypothesis that landlords across India may have been engaging in clandestine arrangements to lease out their land to family members and thereby gain exemption from ceiling laws, since the ceiling was initially stipulated per person and leased-out land was exempt. This would keep inequality in land ownership unchanged but "reduce" inequality in operational holdings.[37] The other possibility would have been to lease out more land to tenants, but there would have been less incentive for the landlords to do so since tenancy reforms were expected to improve the position of tenants at their expense, and they would be more keen to evict their tenants or conceal their tenancy as indicated by the negative coefficient of the tenancy reform in Table 3.8. Evasion was made easier by the fact that there was a lot of deliberation within policy circles regarding the enactment of the land ceiling reform, giving landlords enough time to come up with robust evasion strategies such that by the time the law was implemented, there was not much surplus land to redistribute.[38]

3.5 Conclusion

In this chapter, we examine the evidence on the productivity consequences of land reforms in India. Augmenting the data from Besley and Burgess (2000), we find that the overall impact of aggregate land reform legislation on productivity in India is rather negative. But this conceals a range of heterogeneous effects across across types of land reform as well as across states of India. We

[37]If landlords had sold their land to their family members (even nominally) then both ownership and operational inequality should have decreased.

[38]Owing to the small number of observation per state, we do not cluster the standard errors here. However, with clustered standard errors, all the results are identical except for the effect of land ceiling legilsation in column 4 which is no longer significant.

argue that differential emphasis laid by states on different components of land reform may constitute a possible reason behind such inter-state heterogeneity in land reform experience. In particular, we find that states that passed more land ceiling laws relative to tenancy laws performed worse in terms of productivity. We also provide suggestive evidence that tenancy reform actually increased inequality in operational land holdings in India, which indicates that there might exist indirect and unintended consequences of land reform that may partially undo the direct positive effects that theory would predict. However, a better understanding of such indirect effects of land reform and disentangling them from the direct effects is required and may be gained with the help of more micro-level studies that attempt to explore the microeconomic mechanisms through which land reform affects agricultural productivity.

Bibliography

ACEMOGLU, D., S. JOHNSON, AND J. A. ROBINSON (2001): "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review*, 91(5), 1369–1401.

——— (2002): "Reversal Of Fortune: Geography And Institutions In The Making Of The Modern World Income Distribution," *The Quarterly Journal of Economics*, 117(4), 1231–1294.

——— (2005): "Institutions as a Fundamental Cause of Economic Growth," in *Handbook of Economic Growth*, ed. by P. Aghion, and S. N. Durlauf, pp. 386–414. Elsevier.

AGARWAL, B. (1994): *A Field of One's Own: Gender and Land Rights in South Asia*. Cambridge University Press.

ANDERSON, S. (2003): "Why Dowry Payments Declined with Modernization in Europe but are Rising in India?," *Journal of Political Economy*, 111(2), 269–310.

——— (2004): "Dowry and Property Rights," BREAD Working Paper No. 080.

——— (2007): "The Economics of Dowry and Brideprice," *Journal of Economic Perspectives*, 21(4), 151174.

ANGRIST, J. (2002): "How Do Sex Ratios Affect Marriage and Labor Markets? Evidence from America's Second Generation," *Quarterly Journal of Economics*, 117(3), 997–1038.

APPU, P. S. (1996): *Land Reforms in India: A Survey of Policy Legislation and Implementation*. New Delhi, Vikas Publishing House.

ARUNACHALAM, R., AND S. NAIDU (2008): "The Price of Fertility: Marriage Markets and Family Planning in Bangladesh," mimeo, University of Michigan.

BAES (2002): *Reports on Sample Surveys for Estimating Yield Rate and Production of Major Crops in West Bengal during 1986-87 to 1989-90.* Govt of West Bengal, (authorized for publication).

BAKSHI, A. (2008): "Social Inequality in Land Ownership in India: A Study with Particular Reference to West Bengal," *Social Scientist*, 36(9/10), 95–116.

BANERJEE, A. (1999): "Prospects and Strategies for Land Reforms," in *Annual World Bank Conference on Development Economics 1999*, ed. by B. Pleskovic, and J. Stiglitz, pp. 253–84. World Bank, Washington DC.

BANERJEE, A., P. GERTLER, AND M. GHATAK (2002): "Empowerment and Efficiency: Tenancy Reform in West Bengal," *Journal of Political Economy*, 110(2).

BANERJEE, A., AND M. GHATAK (2004): "Eviction Threats and Investment Incentives," *Journal of Development Economics*, 74(2), 469–88.

BANERJEE, A., AND L. IYER (2005): "History, Institutions and Economic Performance: The Legacy of Colonial Land Tenure Systems in India," *American Economic Review*, 95(4), 1190–213.

BARDHAN, P. (1984): *Land, Labor and Rural Poverty.* Columbia University Press, and New Delhi, Oxford University Press.

BARDHAN, P., AND D. MOOKHERJEE (2007): "Land Reform, Decentralized Governance and Rural Development in West Bengal," Working Paper, University of California, Berkeley and Boston University.

BECKER, G. S. (1991): *A Treatise on the Family.* Harvard University Press, Cambridge, MA.

BEHRMAN, J. R., A. D. FOSTER, M. R. ROSENZWEIG, AND P. VASHISHTHA (1999): "Women's Schooling, Home Teaching and Economic Growth," *Journal of Political Economy*, 107(4), 682–714.

BERTRAND, M., E. DUFLO, AND S. MULLAINATHAN (2004): "How Much Should We Trust Differences-in-Differences Estimates?," *Quarterly Journal of Economics*, 119(1), 249–75.

BESLEY, T. (1995): "Property Rights and Investment Incentives: Theory and Evidence from Ghana," *Journal of Political Economy*, 103(5), 903–937.

BESLEY, T., AND R. BURGESS (2000): "Land Reform, Poverty Reduction, and Growth: Evidence from India," *Quarterly Journal of Economics*, 115(2), 389–430.

BESLEY, T., AND M. GHATAK (2009): "Property Rights and Economic Development," in *Handbook of Development Economics*, ed. by D. Rodrik, and M. Rosenzweig. North Holland.

BIRTHAL, P. S., AND P. P. RAO (2002): *Technology Options for Sustainable Livestock Production in India: Proceedings of the Workshop on Documentation, Adoption, and Impact of Livestock Technologies in India, ICRISAT.*

BOTTICINI, M., AND A. SIOW (2003): "Why Dowries?," *The American Economic Review*, 93(4), 1385–1398.

BRAVERMAN, A., AND J. E. STIGLITZ (1982): "Sharecropping and the Interlinking of Agrarian Markets," *American Economic Review*, 72(4), 695–715.

CARD, D., AND A. B. KRUEGER (1992): "Does School Quality Matter? Returns to Education and the Characteristics of Public Schools in the United States," *Journal of Political Economy*, 100(1), 1–40.

CHIAPPORI, P.-A., B. FORTIN, AND G. LACROIX (2002): "Marriage Market, Divorce Legislation and Household Labor Supply," *Journal of Political Economy*, 2002(110), 37–72.

CONNING, J., AND J. A. ROBINSON (2007): "Property Rights and the Political Organization of Agriculture," *Journal of Development Economics*, 82, 416–447.

DE HAAN, A. (2006): "Disparities within India's Poorest Regions: Why do the Same Institutions Work Differently in Different Places?," *World Development Report*, background paper.

DE SOTO, H. (2000): *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else.* New York: Basic Books and London: Bantam Press/Random House.

——— (2001): *The Mystery of Capital.* IMF, available at http://www.imf.org/external/pubs/ft/fandd/2001/03/desoto.htm.

DEERE, C. D., AND M. LEON (2001): *Empowering Women: Land and Property Rights in Latin America.* University of Pittsburgh Press, Pittsburgh, Penn.

DEERE, C. D., AND M. LEON (2003): "The Gender Asset Gap: Land in Latin America," *World Development*, 31(6), 925–947.

DFID (2007): "Evaluation of DFID Country Programes: West Bengal," Discussion paper.

DITELLA, R., S. GALIANI, AND E. SCHARGRODSKY (2007): "The Formation of Beliefs: Evidence from the Allocation of Land Titles to Squatters," *Quarterly Journal of Economics*, 122(1), 209–241.

DUFLO, E. (2001): "Schooling and Labour Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment," *American Economic Review*, 91(4), 795–813.

——— (2003): "Grandmothers and Granddaughters: Old Age Pension and Intra-Household Allocation in South Africa," *World Bank Economic Review*, 17(1), 1–25.

——— (2005): "Gender Inequality in Development," mimeo, Massachusetts Institute of Technology.

DUFLO, E., R. HANNA, AND S. RYAN (2008): "Incentives Work: Getting Teachers to Come to School," Working Paper, MIT.

DUFLO, E., AND R. PANDE (2007): "Dams," *Quarterly Journal of Economics*, 122(2), 601–46.

DUTTA, B., D. RAY, AND K. SENGUPTA (1989): "Contracts with Eviction in Infinitely Repeated Principal-Agent Relationships," in *The Economic Theory of Agrarian Institutions*, ed. by P. Bardhan. Oxford, Clarendon Press.

EDLUND, L. (2001): "Dear Son-Expensive Daughter: Why Do Scarce Women Pay to Marry?," Working paper, Columbia University.

ENGERMAN, S. L., AND K. L. SOKOLOFF (1997): "Factor Endowments, Institutions, and Differential Paths of Growth Among New World Economies: A View from Economic Historians of the United States," in *How Latin America Fell Behind*, ed. by S. Harber, p. 260304. Stanford University Press.

FIELD, E. (2005): "Property Rights and Investment in Urban Slums," *Journal of the European Economic Association*, 3(2-3), 279–290.

——— (2007): "Entitled to Work: Urban Property Rights and Labor Supply in Peru," *Quarterly Journal of Economics*, 122(4), 1561–1602.

FIELD, E., AND A. AMBRUS (2008): "Early Marriage, Age of Menarche, and Female Schooling Attainment in Bangladesh," *Journal of Political Economy*, 116(5), 881–930.

FOSTER, A., AND M. ROSENZWEIG (1996): "Technical Change and Human Capital Returns and Investment: Evidence from the Green Revolution," *American Economic Review*, 86(4), 931–953.

GOVERNMENT OF INDIA (1961): *Third Five Year Plan.* Planning Commission of India, New Delhi.

——— (2000): *Annual Report of the Ministry of Rural Development.* Annexure 32, 177.

——— (2001): "Census of India 2001," Discussion paper.

GOVERNMENT OF WEST BENGAL (2004): "West Bengal Human Development Report," Discussion paper, Development and Planning Department, Kolkata.

HAMILTON, J. D. (1994): *Time Series Analysis.* Princeton University Press.

HODDINOTT, J., AND L. HADDAD (1995): "Does Female Income Share Influence Household Expenditures? Evidence from Cote d'Ivoire," *Oxford Bulletin of Economics and Statistics*, 57(1), 77–96.

IIPS (2007): "National Family Health Survey (NFHS-3) Report, 200506: India," Discussion paper, International Institute for Population Sciences (IIPS) and Macro International, Mumbai.

JOHNSON, S., J. MCMILLAN, AND C. WOODRUFF (2003): "Property Rights and Finance," *American Economic Review*, 92(5), 1335–1356.

JOSHI, P. C. (1975): *Land Reforms in India: Trends and Perspectives.* New Delhi, Allied Publishers.

KINGDON, G. G. (2007): "The Progress of School Education in India," *Oxford Review of Economic Policy*, 23(2), 168195.

KRISHNAKUMAR, R. (2004): "Reversing Land Reforms," *Frontline*, 21(4), 14–27.

KUHNEN, F. (1982): *Man and Land: An Introduction into the Problems of Agrarian Structure and Agrarian Reform.* Verlag breitenbach Publishers, Germany.

LEMIEUX, T., AND D. CARD (2001): "Education, Earnings, and the 'Canadian G.I. Bill'," *The Canadian Journal of Economics*, 34(2), 313–344.

LEVINE, D., AND M. KEVANE (2003): "Are Investments in Daughters Lower When Daughters Move Away?," *World Development*, 31(6), 1065–1084.

MISHRA, S. K., AND V. K. PURI (2000): *Indian Economy.* New Delhi, Himalaya Publishing House.

NORTH, D. C. (1990): *Institutions, Institutional Change and Economic Performance.* Cambridge University Press, Cambridge.

NORTH, D. C., AND R. THOMAS (1973): *The Rise of the Western World: A New Economic History.* Cambridge University Press, Cambridge, UK.

PAWSON, R., AND N. TILLEY (1997): *Realistic evaluation.* Sage, London.

PITT, M. M., AND S. R. KHANDKER (1998): "The Impact of Group-Based Credit Programs on Poor Households in Bangladesh: Does the Gender of Participants Matter?," *Journal of Political Economy*, 106(5), 958–996.

RAMANUJAM, T. C. A. (2005): "Daughters Better Off than Sons," *The Hindu Business line*, Saturday 1 October.

RAO, V. (1993): "The Rising Price of Husbands: A Hedonic Analysis of Dowry Increases in Rural India," *Journal of Political Economy*, 101(3), 666–77.

ROSENBLUM, D. (2008): "Fertility and Child Mortality: Unintended Consequences of Family Formation in India," Working Paper, Dalhousie University.

ROSENZWEIG, M., AND O. STARK (1989): "Consumption Smoothing, Migration and Marriage: Evidence from Rural India," *Journal of Political Economy*, 97(4), 905–926.

RUD, J. P. (2009): "Literacy and Female Status in Green Revolution India," Working Paper, Royal Holloway London.

SEN, A. (1990): "More than 100 Million Women are Missing," *The New York Review of Books*, 37(20), December 20.

SENGUPTA, S. (1981): "West Bengal Land Reforms and the Agrarian Scene," *Economic and Political Weekly*, 16(25).

SHABAN, R. A. (1987): "Testing Between Alternative Models of Sharecropping," *Journal of Political Economy*, 95, 893–920.

SHARMA, H. R. (1994): "Distribution of Landholdings in Rural India, 1953-54 to 1981-82," *Economic and Political Weekly*, 29(13), A12–A25.

SHARMA, S. D. (1999): *Development and Democracy in India*. Lynne Rienner Publishers.

SWEETMAN, C. (2008): "How Title Deeds Make Sex Safer: Womens Property Rights in an Era of HIV," *From Poverty to Power: How Active Citizens and Effective States Can Change the World*, Oxfam International.

THOMAS, D. (1990): "Intra-household Resource Allocation: An Inferential Approach," *Journal of Human Resources*, 25(4), 635–664.

——— (1992): "The Distribution of Income and Expenditures within the Household," *Annales d'Economie et de Statistique*, 29, 109–136.

THORNER, D. (1976): *Agrarian Prospect in India*. Allied Publishers, New Delhi.

UPADHYAY, R. (2001): "The Politics of Education in India: Need for a National Debate," South Asia Analysis Group, Paper No.229.

USAID (2006): "Study on Women and Property Rights: Project Best Practices," Discussion paper, ARD, Inc.

YUEH, L. Y. (2001): "A Model of Parental Investment in Children's Human Capital," .