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The Influence of Gender Budgeting in Indian States
on Gender Inequality and Fiscal Spending

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The Influence of Gender Budgeting in Indian States on Gender Inequality and Fiscal Spending*

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Abstract

This study investigates the effect of gender budgeting in India on gender inequality and fiscal spending. Gender budgeting is an approach to budgeting in which governments use fiscal policies and administration to address gender inequality and women's advancement. There is little quantitative study of its impact. Indian states offer a relatively unique framework for assessing the effect of gender budgeting. States with gender budgeting efforts have made more progress on gender equality in primary school enrollment than those without, though economic growth appears insufficient to generate equality on its own. The implications of gender budgeting for fiscal spending were more ambiguous.

I. INTRODUCTION

Gender budgeting initiatives seek to integrate gender-related goals into fiscal policies and administration as a means to achieve gender equality and promote women's development.[1] A host of countries have adopted gender budgeting initiatives, including many in Asia. The most notable initiatives in the region include those in India and the Philippines, among the developing countries, and Australia and the Republic of Korea, among the developed countries.

The link between gender equality and improved economic efficiency and productivity is well established.[2] Improving women's opportunities in education, access to appropriate healthcare, and ability to participate in paid employment are all crucial elements in achieving gender- and poverty-related goals, as embodied in the Millennium Development Goals and its successor, the Sustainable Development Goals. Gender budgeting can thus indirectly contribute to stronger and more inclusive or equitable economic growth via its influence on fiscal policies.

This paper explores the effect of gender budgeting efforts in Indian states by focusing on the effect of gender budgeting on two sets of outcome variables, those related to gender equality and those related to public spending. Although gender budgeting efforts, in the international context, now date back several decades, there has been little effort to assess the results of these efforts in a quantitative manner. This study thus adds an important dimension to research on gender budgeting.

Gender budgeting at the state level in India offers a suitable empirical framework for assessment of its effectiveness because 16 out of 29 states adopted and sustained gender budgeting efforts. Indian states introduced gender budgeting at various times over the past 15 years, with varying degrees of intensity, complementing a central (or Union) government initiative. This study also benefits from access to good quality data on gender equality indicators, fiscal variables, and other demographic variables, over the period before and during the gender budgeting efforts. Although one strength of the empirical approach is relying on state, rather than national, data, even a state aggregation may be limited in evaluating the effects of gender budgeting, because these efforts may be directed to specific components of state sectoral spending or influence structures of programs rather than just the amount of sectoral spending. The limitations of using aggregate data suggest that this analysis should be complemented by studies that look at the effect of gender budgeting efforts with evidence drawn from more micro-based specifications.[3]

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[1] See Stotsky (2016) for a general overview and the fiscal context of gender budgeting and Chakraborty (2016) for a review of gender budgeting in Asia, including India's efforts.

[2] See World Bank (2011) and Duflo (2012) for comprehensive surveys of the relevant literature.

[3] Duflo (2012) makes a similar point regarding the pros and cons of macro- and micro-oriented studies exploring the relationship between gender inequality and growth.

Using state-level panel data, we show that gender equality, as measured by gender equality indices for enrollment in primary schools, improved significantly in gender budgeting states compared to states that did not put in place gender budgeting, while, with a smaller data sample, there was no significant effect on secondary school enrollment. Gender budgeting had an ambiguous influence on sector-level fiscal spending. The empirical results are broadly supportive of a positive role for gender budgeting in addressing gender inequality and support the conclusion that some Indian states have put in place meaningful gender budgeting initiatives. However, further study, with more disaggregated fiscal and household level data, would be beneficial.

The remainder of the paper is organized as follows. Section II provides a survey of the related literature on modeling the determinants of gender inequality and of fiscal spending, and also summarizes the main findings of three studies that have examined the success of gender budgeting in India in the Union and state governments. Section III provides an overview of the structure of fiscal federalism in India. Section IV presents descriptive statistics on our samples of data for the sets of dependent variables for gender inequality and fiscal spending. Section V describes the empirical approach for both sets of dependent variables. Section VI discusses the empirical findings. Section VII provides concluding remarks and discusses implications for fiscal policy.

II.   LITERATURE REVIEW

Gender budgeting was first adopted at the Union level in India in 2000 and then the states followed. The Union initiative was institutionalized through the development of a system of classification of budgetary transactions, and the formation of groups or cells in each Ministry of the government to lead efforts to identify gender-related goals and ways to achieve these goals through the budget.[4] Drawing upon the central government framework, states began to adopt gender budgeting, starting with Odisha in 2004. Since then, another 15 states have adopted gender budgeting efforts as well, so that now a majority of Indian states have some form of gender budgeting in place (see Appendix A).[5]

Several recent studies provide an overview and assessment of the success of gender budgeting efforts at the state level in India, though none of these studies has undertaken formal econometric evaluation.[6] These studies indicated that state governments have implemented gender budgeting using a variety of approaches. Some of these approaches draw on a state policy for gender-related goals and including gender budget statements in the state budget. The substantive focus of gender budgeting initiatives has varied across states

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[4] See Chakraborty (2016).

[5] Table A1 in Appendix A lists all the states and dates of adoption.

[6] See Center for Budget and Governance Accountability (2012), Joshi (2013), and Ministry of Women and Child Development (2015).

but has generally focused on the identification of critical goals to improve girls and women's education, health, and welfare, and to build state infrastructure essential to these objectives and women's economic empowerment. The states have pursued a variety of organizational approaches that include setting up nodal departments or groups for gender budgeting; setting up committees for oversight; improving gender data; and training staff on the analytical methods that can be used to incorporate gender-related goals into the budget. Appendix B provides a brief description of gender budgeting initiatives in a number of Indian states.[7]

The studies have drawn a mixed conclusion on the effectiveness of gender budgeting efforts. The Ministry of Women and Child Development (2015) found that a number of states had institutionalized gender budgeting including Karnataka, Kerala, Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, and others. In Karnataka, gender budgeting was adopted in 2006/07 and a Gender Budget Cell was established with the Finance Department to collaborate with the Women and Child Development Department to promote gender budgeting. The initiative led to the institution of Gender Budget Statements in the annual budget process with accompanying circular asking state departments to indicate what programs were devoted or had a substantial component devoted to goals for women and girls. A report on gender budgeting indicating allocations to relevant programs has been published since 2010 in the state finance accounts. A key part of the program was the introduction of the "Karnataka Mahila Abhivruddhi Yojana" scheme, which is intended to allocate one-third of the resources in individual beneficiary-oriented and labor-intensive schemes of the government, across the areas of government spending, with a focus on education and skills training for jobs as well as social welfare and infrastructure programs.[8] In Kerala, gender budgeting was adopted in 2008/09 and the gender budget statement was also introduced. Some specific programs adopted as part of the initiative were for protection of women against domestic violence, school programs geared to training women for specific job skills, health and sanitation spending, and a transportation-related scheme to address female-oriented goals. The report noted, however, that a lack of sex-disaggregated data was one principal hindrance to more effective gender budgeting efforts at the state level.

Joshi (2013) evaluated gender budgeting efforts in six states: Madhya Pradesh, Rajasthan, Andhra Pradesh, Gujarat, Jharkhand, and Odisha. The study concluded that implementation has varied and some states' efforts have focused mainly on pro forma, rather than substantive, actions. Centre for Budget and Governance Accountability (2012) also evaluated state-level gender budgeting efforts. Like the other two studies, it found variation in approaches among the different states. Focusing on Bihar, Karnataka, Kerala, and Madhya Pradesh, it concluded that Kerala and Madhya Pradesh had the most substantive efforts that had led to meaningful change in fiscal policies to address gender-related goals.

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[7] The appendix provides a summary of gender budgeting efforts on only a little over half of states with gender budgeting because these were the only ones for which we could obtain a detailed description.

[8] See http://dwcd.kar.nic.in/dwcd_english/prg_women.html.

Our empirical specification draws upon two distinct strands of research. One strand examines the simultaneous relationship between gender inequality and economic efficiency, productivity, and growth. World Bank (2011, Box 0.1, p. 49) highlights the difficulties in empirically assessing the causal relationship between gender inequality and growth. For instance, improvements in technology that lead to growth and emphasize cognitive skills in the workplace may create more opportunities for women in the workforce, given their relatively higher achievement in education in many countries in recent years. However, better public services accompanying growth may improve gender equality in education. Moreover, there are factors like improvements in health care that may independently influence both growth and gender inequality. Empirical studies have used a variety of approaches to assess this relationship, including models derived explicitly from theory or simulation approaches, and those that use reduced forms with variables of relevance including income and other economic, demographic, and political factors.

A second strand draws upon the literature on modeling public spending and revenue decisions. A variety of approaches are found, extending from frameworks where fiscal decisions are determined by collective choice processes in which the government seeks to maximize utility or social welfare and demand for spending emerges from solving this problem, to alternative theories that see government motivations stemming from political economy and institutional considerations.[9] A related topic examines the effect of intergovernmental grants on fiscal decisions. The normative theories of fiscal federalism support a role for intergovernmental transfers to help achieve efficiency and equity goals in a fiscal system comprising multiple layers of government (Bradford and Oates, 1971). A sizeable literature has examined in an empirical framework the effect of intergovernmental grants on fiscal decisions (Hines and Thaler, 1995).[10]

Our empirical approach, for both dependent variables, is reduced form in that we do not specify a social welfare function from which we derive specific demand equations, nor do we posit a more general model of the transmission of gender budgeting through the budget to gender inequality. Instead, we rely on the frameworks above to specify certain key determinants of both spending and gender inequality, which are consistent with an underlying social welfare-based theory.

Our approach to gender budgeting presumes that higher spending on fiscal objectives, such as education and health, would lead to better outcomes. Relatively few studies have examined the efficiency of public social sector spending in India. Kaur and Misra (2003) examine the relationship between social sector spending and outcomes, in India, over the 1985/86-2000/01 period. They conclude that public spending on education was productive,

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[9] Hindriks and Myles (2006) provide a useful overview of different approaches.

[10] Dahlberg, Mork, Rattso, and Agren (2008) found, using data from Sweden, that grants from the central government increased local spending, and that taking into account the endogeneity of grants was critical in assessing accurately the marginal impact of grants on local fiscal decisions.

though more so at the primary than the secondary level and in poorer states. The relationship between public spending on health and health outcomes was weaker, mainly as a consequence of inadequate, rather than ineffective, spending. They also found that state spending on education was more instrumental than spending on health in narrowing gender disparities. Chakraborty (2010) suggest integrating gender equity into the intergovernmental grants process.

There are a variety of ways one can measure gender inequality. We focus on school enrollment inequality in this paper because it is one critical indicator of equality. Women's labor force participation compared to men's is another important indicator of gender equality. Khera (2016) and Das et al. (2015) examine the impact of gender-related policies on relative rates of labor force participation. Both studies find that government policies that increase female education, social spending, and labor market flexibility raise women's labor force participation. Das et al. (2015) also finds that higher investment in infrastructure is beneficial. We do not examine this issue in our study because our empirical specification is designed to capture the determinants of fiscal spending and relevant labor market data are not available in our data set.

III. OVERVIEW OF FISCAL FEDERALISM IN INDIAN STATES

India consists of 29 states and 7 Union territories. Two out of the seven Union territories, Delhi and Pondicherry, have their own elected governments, while the remaining territories are administered by officials appointed by the Union government. State governments have their own elected governments. State governments are further split into urban and rural local governments. Rural local government consists of district, block, and village panchayats (i.e., elected councils). Figure 1 provides an overview of the structure of government in India.

India's system of fiscal federalism has evolved over time (Rao, 2009; Jha, 2014; Biswas, Marjit, and Maimoutou, 2010). The two-tier structure of Union and state governments evolved into a third tier of local government after 1992. States are largely responsible for education, health, infrastructure, and economic services (Rao, 2009). An important point about their finances is that their spending is much higher than their own source revenues tax and non-tax revenues and thus they are highly reliant on transfers from the Union government.

Figure 1. Structure of Government in India
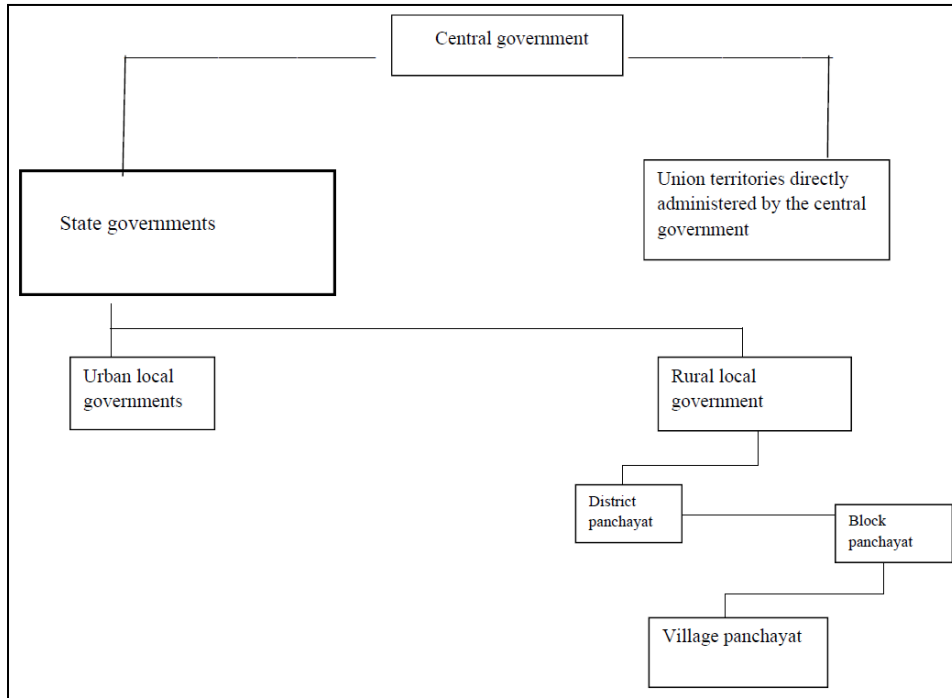
Source: Jha (2014).

The Union government transfers to states traditionally came in three main forms: Finance Commission Transfers, Planning Commission Transfers, and Centrally Sponsored Transfers. The Finance Commission is a constitutional body, appointed by the President and answerable to the national Parliament, which assembles every five years or earlier to recommend devolution of taxes and grants-in-aid to the states for the ensuing five years. The Planning Commission, which is now disbanded, was accountable to the Prime Minister and was established to determine transfers to states by a formula determined by the National Development Council. It placed a high weight on population and per capita income of the state. Central government ministries also give specific purpose transfers to states. The recent restructuring of the fiscal transfer mechanisms and the impact of fiscal transfers on state decisions is analyzed in Chakraborty and Gupta (2016) and Chakraborty (2016). Biswas et al. (2010) use panel data on state governments to show that the political alignment of states with the Union government has a significant influence on transfers to the state governments.

IV. DESCRIPTIVE STATISTICS

The data for our study are mainly drawn from the CEIC India Premium Database, which consists of annual time series data for the 29 Indian states, 7 Union territories, and 640 districts, over 1991-2015. We draw upon fiscal, income, demographic, and gender inequality

variables.[11] Our empirical analysis is based on data, covering all states, of which 16 have undertaken gender budgeting and 13 have not. The state of Andhra Pradesh was split into two states, Telengana and Andhra Pradesh, in June 2014. Because we use data only up to fiscal year 2014 (April 1, 2013 to March 31, 2014), we exclude Telengana from subsequent analysis. We use three samples, depending on the availability of data for the dependent variables. For gender inequality, we use gender equality in enrollment in primary education and gender equality in secondary education. The primary and secondary school gender equality variables are constructed as follows: the number of female or male students enrolled at the relevant schooling level, regardless of age, is divided by the population of the relevant age group. Then the ratio of female to male ratios is taken.[12] Fiscal spending is measured in real per capita terms, and we examine total and key components of spending.

The samples of data for primary education and fiscal spending encompass the period before gender budgeting was in place for all states and for most, at least several years afterwards. However, the sample for secondary education is available only for a period beginning following the start of gender budgeting in some states. Union territories are dropped because they are administered by the central government and have limited fiscal autonomy.

Tables 1a and 1b provide summary data for the two different samples, corresponding to the dependent variables for primary education and fiscal spending. Table 1a presents data on gender equality, measured through school enrollment, and also presents data on income, and population. Although most states are close to parity in the female to male ratio in lower primary school enrollment, there are still a few that lag, and the ratios worsen at each successive level of education. The populations of Indian states vary widely from less than 1 million people to almost 200 million people, larger than most countries in the world. Income per capita and gross state domestic product also vary widely. Services are the predominant source of state income, though agriculture and manufacturing are also important contributors.

Table 1b presents data on the fiscal spending variables. Social services spending comprises the largest share of spending, followed by education and infrastructure. The share of spending on health is notably low. Taxes and non-tax revenues are both important. Shared central government taxes are a little under half of state taxes and central government grants are over half of state non-tax revenues.

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[11] Table A2 in Appendix A reports on the variables and availability by time of the data.

[12] Lower primary school roughly encompasses age 6 to 10 and upper primary school 11 to 13. Lower secondary school roughly encompasses age 14 to16 and upper secondary school, higher grades. It is possible to have female to male ratios above 1 because of repeating students or enrollment of students above the typical age.

Table 1a. Summary Statistics for Gender Inequality Dependent Variables (2002-2011)

Type	Description	N	mean	median	sd	min	max
Gender equality index	Gender equality index: lower primary school	280	0.98	0.98	0.06	0.75	1.18
	Gender equality index: upper primary school	280	0.94	0.96	0.11	0.59	1.22
	Gender equality index: lower secondary school	168	0.93	0.96	0.14	0.57	1.20
	Gender equality index: upper secondary school	168	0.90	0.90	0.16	0.53	1.33
Population	Population (millions)	280	38.3	27.6	41.5	0.6	199.4
GDP	Income per capita (real (2014=100)), thousand rupees	280	56.9	50.5	30.2	13.0	207.2
	Gross state domestic product (nominal), billion rupees	280	1,267.4	799.3	1,535.7	11.4	10,491.5
	Gross state domestic product (real (2014=100)), billion rupees	280	1,907.4	1,234.9	2,136.3	20.9	12,495.8
Sectoral share (percent of state GDP)	Agriculture GDP (percent of state GDP)	280	18.7	18.9	6.5	2.2	34.4
	Manufacturing GDP (percent of state GDP)	280	12.7	11.5	8.1	1.1	39.0
	Services GDP (percent of state GDP)	280	48.2	47.8	7.3	30.7	64.1

Sources: CEIC India Premium Database and IMF estimates.

Note: Average nominal GDP is less than average real GDP because the nominal figures are indexed to 2014.

Table 1b. Summary Statistics for Fiscal Spending Dependent Variables (2002-2014)

Type	Description	N	mean	median	sd	min	max
Expenditure (real per capita terms, thousand rupees)	Total	351	15.5	12.4	10.9	3.1	65.4
	Social services	351	5.1	4.0	3.4	1.0	18.9
	Education	351	2.4	2.0	1.5	0.6	8.5
	Health	351	0.7	0.5	0.5	0.1	3.2
	Welfare	351	0.9	0.7	0.7	0.1	4.2
	Infrastructure	351	2.3	1.6	2.2	0.3	18.8
Revenue (real per capita terms, thousand rupees)	Total	351	13.4	10.4	9.7	2.3	54.6
	Total tax	351	6.3	5.8	3.5	1.0	23.8
	Tax (shared taxes from center)	351	2.3	2.0	1.4	0.3	9.2
	Total non-tax	351	7.1	3.1	8.6	0.4	46.1
	Non-tax (grants from center)	351	5.5	1.5	8.0	0.2	38.3
Population	Population (millions)	351	40.4	29.0	42.6	0.9	209.8
GDP	Income per capita (real (2014=100)), thousand rupees	351	63.3	55.6	35.4	13.0	257.4
	Gross state domestic product (nominal), billion rupees	351	1,720.5	968.4	2,160.1	19.5	15,101.3
	Gross state domestic product (real (2014=100)), billion rupees	351	2,275.6	1,476.7	2,521.1	31.8	15,101.3
Sectoral share (percent of state GDP)	Agriculture GDP (percent of state GDP)	351	18.5	18.6	6.5	2.2	34.4
	Manufacturing GDP (percent of state GDP)	351	12.6	11.5	7.8	1.0	34.9
	Services GDP (percent of state GDP)	351	48.7	48.7	7.5	30.2	66.2

Sources: CEIC India Premium Database and IMF estimates.

Note: Average nominal GDP is less than average real GDP because the nominal figures are indexed to 2014.

Tables 2a and 2b compare the gender budgeting states with the non-gender budgeting states for the two different samples, corresponding to the dependent variables for gender inequality and fiscal spending. The gender budgeting states are, on average, larger in population, have lower per capita income, and have lower gender equality indices for education. Their spending and their total revenues are lower in per capita terms. All of the areas of spending and revenues are lower in per capita terms, except central government grants, which are a little higher in gender budgeting states.

Table 2a. Gender Budgeting vs. Non-Gender Budgeting States (2002-2011)

Description	Gender budgeting states	Non-gender budgeting states
Gender equality index: lower primary school	0.97	1.00
Gender equality index: upper primary school	0.91	0.99
Gender equality index: lower secondary school	0.88	1.00
Gender equality index: upper secondary school	0.85	0.97
Population (millions)	46.7	27.0
Income per capita (real (2014=100)), thousand rupees	52.1	63.2
GDP (nominal), billion rupees	1,450.5	1,023.2
GDP (real (2014=100)), billion rupees	2,177.4	1,547.4
Agriculture GDP (percent of state GDP)	19.2	18.0
Manufacturing GDP (percent of state GDP)	12.3	13.2
Services GDP (percent of state GDP)	47.7	48.8

Sources: CEIC India Premium Database and IMF estimates.

Table 2b. Gender Budgeting vs. Non-Gender Budgeting States (2002-2014)

Description	Gender budgeting states	Non-gender budgeting states
Total expenditure (real per capita, thousand rupees)	14.7	16.8
Social services expenditure (real per capita, thousand rupees)	4.8	5.6
Education expenditure (real per capita, thousand rupees)	2.3	2.6
Health expenditure (real per capita, thousand rupees)	0.7	0.8
Welfare expenditure (real per capita, thousand rupees)	0.8	1.0
Infrastructure expenditure (real per capita, thousand rupees)	2.2	2.5
Total revenue (real per capita, thousand rupees)	12.8	14.2
Total tax revenue (real per capita, thousand rupees)	5.8	6.9
Tax revenue: shared from center (real per capita, thousand rupees)	2.2	2.3
Total non-tax revenue (real per capita, thousand rupees)	7.0	7.3
Non-tax revenue: grants from center (real per capita, thousand rupees)	5.8	5.2
Population (millions)	47.8	29.7
Income per capita (real (2014=100)), thousand rupees	58.9	69.7
GDP (nominal), billion rupees	1,912.1	1,441.8
GDP (real (2014=100)), billion rupees	2,520.8	1,918.8
Agriculture GDP (percent of state GDP)	19.0	17.8
Manufacturing GDP (percent of state GDP)	12.1	13.3
Services GDP (percent of state GDP)	48.2	49.6

Sources: CEIC India Premium Database and IMF estimates.

Table 3 provides state by state detail on education spending and the gender equality indices for different levels of education and the measure of gender inequality in this data set. This table provides a good illustration of the wide variation in gender inequality, measured by school enrollment ratios, and spending on education across the states, in both groups of states, those with and without gender budgeting. Among the gender budgeting states, several states, including Kerala, are notable for equality or close to equality in all enrollment ratios, while Bihar is notable for its low ratios, even at the primary level. Considerable variation is

Table 3. State by State Comparison of Education Spending and Gender Equality

Indian states	Education spending (percent of state GDP)	Education spending (real per capita, thousand rupees (2014=100))	Gender equality index: lower primary school (female to male ratio)	Gender equality index: upper primary school (female to male ratio)	Gender equality index: lower secondary school (female to male ratio)	Gender equality index: upper secondary school (female to male ratio)
	(average 2002-2011)				(average 2006-2011)	
Gender budgeting states						
Arunchal Pradesh	7.58	4.92	0.92	0.89	0.91	0.85
Bihar	4.91	0.90	0.83	0.73	0.73	0.73
Chhattisgarh	2.66	1.22	0.94	0.88	0.86	0.76
Gujarat	2.04	1.40	0.95	0.85	0.78	0.83
Himachal Pradesh	4.84	3.46	1.00	0.97	1.00	0.93
Jammu and Kashmir	4.61	2.24	0.97	0.89	0.89	0.91
Karnataka	2.73	1.70	0.98	0.96	0.98	1.02
Kerala	2.82	1.93	1.00	0.96	1.00	1.18
Madhya Pradesh	2.58	0.91	0.98	0.89	0.67	0.69
Maharashtra	2.54	1.89	0.98	0.97	0.95	0.86
Nagaland	5.10	2.67	0.99	1.03	1.08	0.92
Odisha	3.07	1.28	0.98	0.91	0.90	0.78
Rajasthan	3.28	1.47	0.95	0.72	0.65	0.60
Tripura	5.89	2.33	0.97	0.98	0.99	0.79
Uttarakhand	4.39	2.51	1.03	1.02	0.91	0.97
Uttar Pradesh	3.13	0.90	1.00	0.85	0.78	0.81
Non-gender budgeting states						
Andhra Pradesh	3.12	1.86	1.01	0.97	0.99	0.86
Assam	4.53	1.58	1.01	0.98	0.93	0.83
Goa	2.82	3.82	0.96	0.94	0.98	1.05
Haryana	2.02	1.83	1.07	1.02	1.09	0.97
Jharkhand	3.62	1.12	0.93	0.82	0.83	0.84
Manipur	7.55	2.56	0.97	0.95	1.01	0.83
Meghalaya	4.65	1.99	1.01	1.10	1.10	1.20
Mizoram	9.60	5.20	0.95	0.97	1.04	0.98
Punjab	2.08	1.48	1.04	1.01	1.02	1.00
Sikkim	10.65	7.64	0.99	1.18	1.11	1.09
Tamil Nadu	2.30	1.58	1.00	0.98	1.02	1.21
Telangana	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
West Bengal	2.60	1.32	1.00	1.00	0.96	0.83

Sources: CEIC India Premium Database and IMF estimates.

also found in the spending levels. Special states (typically those along the northern border) tend to have weak economies and a high level of central government transfers, thus resulting in unusually high spending levels in comparison to the other states. Among the non-gender budgeting states, there is also variation from strong to weak performing states.

Figure 2 shows the trends in total expenditure and its key components in gender budgeting and non-gender budgeting states. During the period of the sample (during which states adopted gender budgeting at different points in time), total spending, as a share of state GDP, in non-gender budgeting states was increasing, as compared to the gender budgeting states, where spending was declining and then flat.[13] The trends in spending reflect in part the effect of the Fiscal Responsibility Act of 2003, which led to fiscal restraint and an improvement in

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[13] A simple average of states was taken. Sikkim was excluded because fiscal aggregates relative to GDP were clear outliers compared to the other states reflecting the state's unusually high dependency on central transfers.

Figure 2. Spending Trends in Gender Budgeting vs. Non-Gender Budgeting States (2002-2014)
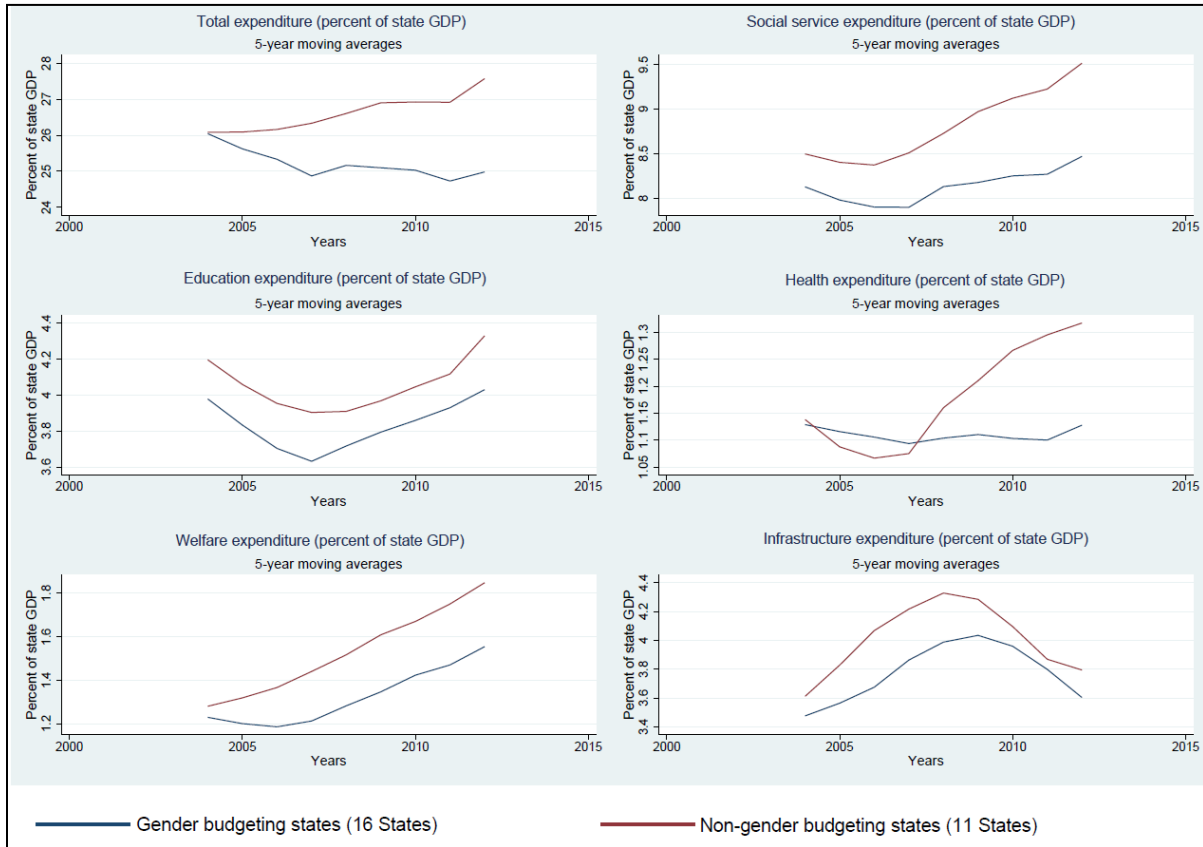
Sources: CEIC India Premium Database and IMF estimates.

the state government primary balance (the revenue and expenditure balance minus interest payments) (Jha, 2014). The spending trends suggest that fiscal restraint appears to have fallen more heavily on the gender budgeting states.

In the period following the 2008 global financial crisis, India undertook stimulative fiscal policies and the fiscal austerity in the states appeared to ease. Trends in average education, welfare, and infrastructure spending were somewhat similar across both groups of states while health expenditure was decreasing or flat in gender budgeting states as compared to the non-gender budgeting states, where it was strongly increasing, after an initial drop.

Figure 3 shows the trends of average total revenue and its key components in gender budgeting and non-gender budgeting states, over the period of the sample. On the revenue side, we see that gender budgeting states saw a rise then fall in revenue while non-gender budgeting states saw a uniform increase. Differences in the trends can be observed in all

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Figure 3. Revenue Trends in Gender Budgeting vs. Non-Gender Budgeting States (2002-2014)
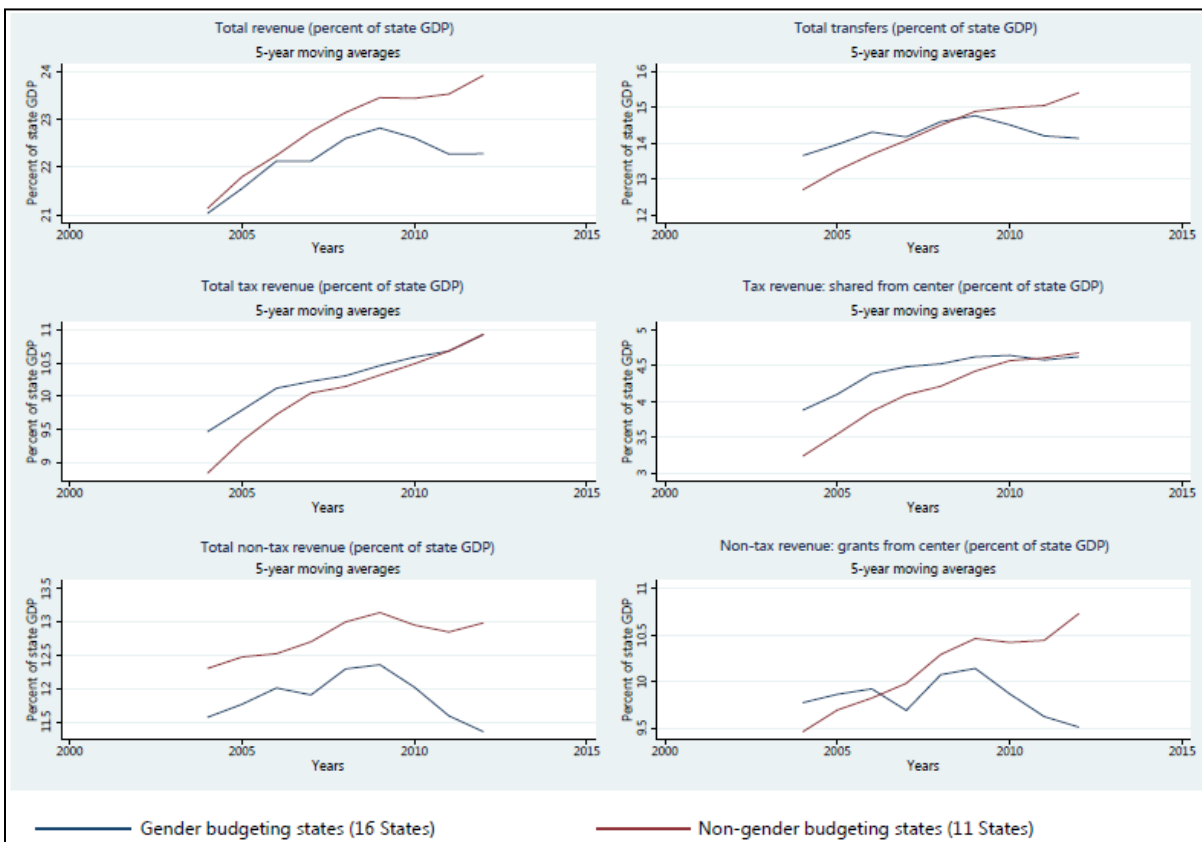
Sources: CEIC India Premium Database and IMF estimates.

components of revenue, though the starkest difference is with regard to grants from the center, which declined sharply in the gender budgeting states.

Figure 4 presents trends in gender inequality measures, constructed as the ratio of female to male enrollment, comparing gender budgeting and non-gender budgeting states from the beginning to the end of the primary and secondary school samples, using simple averages within each of the two groups. Both groups made progress in equalizing enrollment of females in primary school, with the gender budgeting sample improving more in both lower and upper primary school. Similarly, both groups made progress in lower and upper secondary school, though the differences between the two groups are not as great here.

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Figure 4. Comparison over Time in Gender Inequality Indicators
(Gender budgeting vs non-gender budgeting states)

Gender equality index: lower primary school

Gender equality index: upper primary school

Gender equality index: lower secondary school

Gender equality index: upper secondary school
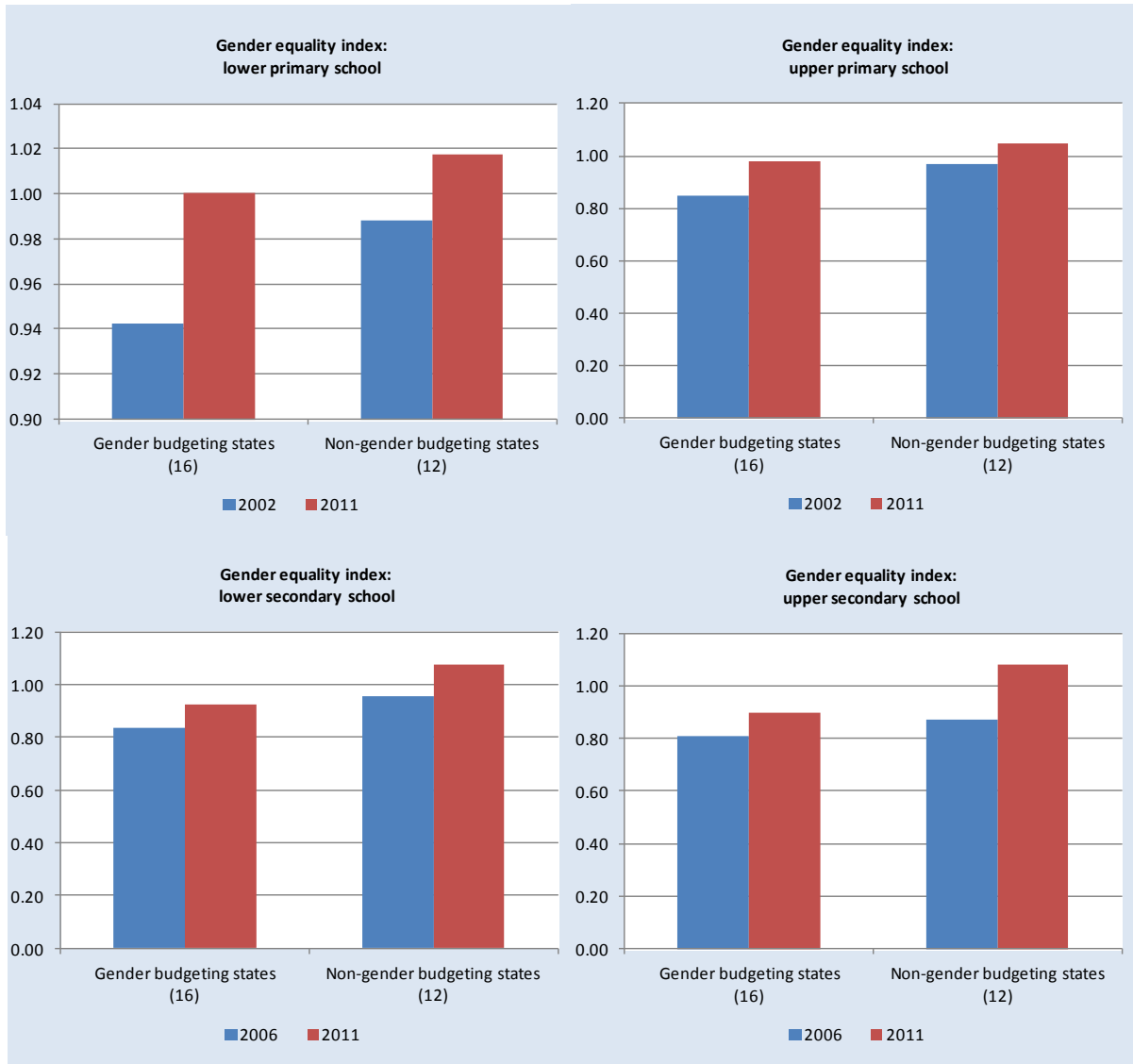
Sources: CEIC India Premium Database and IMF estimates.

Figure 5 presents trends in fiscal spending measures, comparing gender budgeting and non-gender budgeting states from the beginning to the end of the fiscal sample. Both groups saw an increase in all components of spending, with non-gender budgeting states widening the initial gap in total spending, consistent with the data presented earlier. Infrastructure spending appears to have seen the smallest widening of the gap between the two groups.

Figure 5. Comparison over Time in Fiscal Spending Indicators
(Gender budgeting vs non-gender budgeting states)
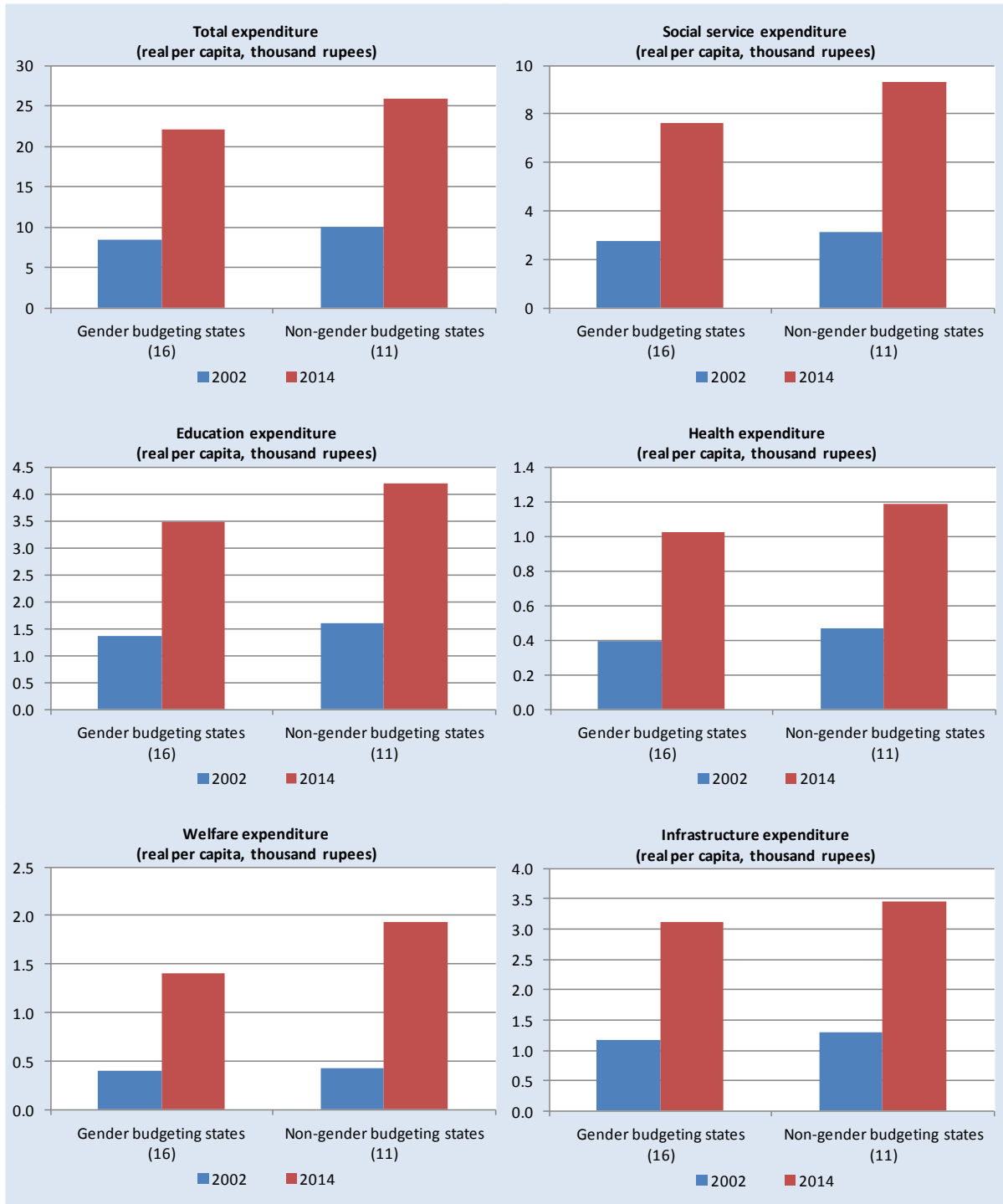
Sources: CEIC India Premium Database and IMF estimates.

V.   EMPIRICAL SPECIFICATION

With these simple comparisons in mind, we now investigate the effect of gender budgeting on gender equality and fiscal spending using econometric techniques to allow us to measure in a framework with control variables the effect of gender budgeting. The first model examines the effect of gender budgeting on gender equality indicators, and the second, the effect of gender budgeting on fiscal spending variables. As noted, we employ a reduced form relationship for the empirical specification. For the second approach, the underlying theory of demand for state expenditures suggests that the explanatory variables should be exogenous price and income variables. In our analysis, for both sets of dependent variables, we subsume the price variable and use Union transfers along with state real per capita income as determinants of the revenue base and state spending as well as underlying determinants of gender inequality.[14]

One critical issue is how to measure the effect of gender budgeting given that these efforts are intended to influence budgetary decisions but have many different features, many of which, like changes in the structure of spending or administrative measures, are hard to quantify. As we described earlier, gender budgeting efforts in Indian states have taken a variety of forms and have differed in both their emphasis on policy and administrative aspects and within these two broad categories have also varied in terms of which sectors were of focus and other important attributes.

We measure the effect of gender budgeting through the use of a dummy variable, where the variable takes a value of 1, if the state has gender budgeting effort in place and 0, if the state does not. The various studies on gender budgeting in India do not suggest that any state that adopted gender budgeting formally dropped it. Thus, once the state adopts gender budgeting, the dummy variable takes a value of 1 for the remainder of the sample.[15] Although an index might provide a more refined quantitative measure of the gender budgeting efforts, we were not able to collect enough systematic information on the gender budgeting efforts across the states and over time to construct this variable with sufficient accuracy to use in the analysis.

Another important issue is the possibility of a simultaneous relationship between the dependent variable and the gender budgeting variable. It is entirely plausible that gender inequality might drive gender budgeting efforts if gender budgeting is seen as an effective way to help address this inequality. It is less plausible that fiscal spending would drive

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[14] Tables A3 and A4 in Appendix A present simple correlation matrices for the primary school and fiscal spending samples.

[15] We treat gender budgeting efforts as having an ongoing effect on gender inequality and fiscal decisions, rather than as a decision that is only taken once, akin to the participation decision in a labor supply equation, which is of less interest. Our analysis of the data suggests no systematic pattern to the adoption of gender budgeting by states. We hypothesize that adoption may be more closely related to political rather than economic variables and formally test with a probit analysis that includes political and governance variables (Appendix C).

gender budgeting except through some indirect channels (for instance, if spending on education leads to a better educated population that then is induced to support progress on gender equality through gender budgeting). We test for this endogeneity.

An alternative specification for the gender inequality equation makes use of a framework in which we specify gender inequality as a function of spending indicators instead of revenue indicators. However, as noted, gender budgeting does not only influence total spending but could also influence the composition, so even this is not a fully satisfactory approach to capturing the effect of gender budgeting.

The following equation is estimated to measure the impact of gender-budgeting on outcomes.

$$Y_{it} = \beta GB_{it} + \delta X_{it} + \eta_i + \nu_t + \varepsilon_{it}$$

where Y_{it} is the dependent variable in state i in year t, representing gender inequality and expenditure indicators; GB_{it} is the gender budgeting dummy that accounts for whether there is an ongoing gender budgeting effort in state i in year t; X_{it} is a vector of explanatory variables, representing other factors which might determine the dependent variable; ε_{it} is the random error term; and β and δ are parameters to be estimated. The models also include only state fixed effects, η_i, which control for the time-invariant state characteristics of state i, or both state fixed effect and time fixed effects, ν_t, to control for common time-variant factors affecting the dependent variable across states. The state fixed effects might capture any of a number of systematic and invariant (at least over the period of the sample) differences across states, such as the political environment or religious, cultural, and linguistic traditions. For instance, Kerala is well known in India as a state with a strong matriarchal tradition, where property is inherited through the mother, while most states in India have strong patriarchal traditions, where fathers are the head of the extended family. India is also a country with many different religions and languages, with the dominant religion and language varying considerably from one state to another. We do not try to control more specifically for these influences.

As noted earlier, we use two sets of dependent variables, representing gender inequality and fiscal spending. Ideally, we would have other variables for gender inequality beyond the enrollment ratios. However, the database unfortunately did not provide any other variables. Other indicators, such as maternal mortality and infant mortality were available but are, in our view, better indicators of level of development than gender equality. For spending, we used total spending and key components, including social services, education, health, welfare, and infrastructure.[16]

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[16] These components are obtained by aggregation of more disaggregated categories of expenditures in the database. We aggregated as follows: For total expenditures, we used all spending. For social services, we included all development expenditure on social services. For education, we included expenditure on education,

For explanatory variables, we use the following variables: real income per capita and transfers from the Union government, which include both shared taxes and grants, both measures in the natural log of real per capita amounts; population, measured in millions; and agriculture GDP, manufacturing GDP, and services GDP, all measured as a proportion of state GDP (the omitted category is other forms of economic activity). Population is used to control for economies of scale in provision of public services and might also have an effect of gender inequality through indirect means (for instance, states with larger populations might be more exposed to outside influences). Similarly, the share of the state economy in various types of economic activity could influence both gender inequality by indirect means (for instance, the tendency for women to fill or be hired for certain jobs varies across industries) and fiscal spending by serving as a proxy for taste preferences or the influence of the structure of the tax base.

We examine the effect of gender budgeting on gender equality and fiscal spending using a panel data approach. For our econometric model, we tested ordinary least squares (OLS), fixed effects, and random effects specifications. We present only the fixed effect models, which the statistical testing supported as the best representation.[17] We also tried generalized method of moments (GMM) approaches to account for a lagged dependent variable specification and to address potential endogeneity of the independent variables. The lagged dependent variable may better account for the process by which gender equality indicators and fiscal spending measures evolve over time.

VI. RESULTS

We present the results of the various estimations with the gender equality dependent variables in Tables 4-7 and with the fiscal spending dependent variables in Tables 8-10.

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sports, art, and culture. For health expenditures, we included expenditure on nutrition, medical, and public health. For welfare expenditures, we included expenditure on family welfare, welfare of scheduled castes, tribes and other backward classes, labor welfare, social security and welfare, and housing. For infrastructure expenditures, we included expenditure on transport and communication, irrigation and flood control, and water supply and sanitation.

[17] For OLS vs. fixed effects, we conducted the F-test of the joint significance of the fixed effects intercepts for which the null hypothesis is that all of the fixed effect intercepts are zero. In all of our regression results, we rejected the null hypothesis, justifying our use of fixed-effects. For fixed vs. random effects, we conducted the Hausman specification test for which the null hypothesis is that the slope coefficients of the two models being compared do not differ significantly. If the estimates are different, then we reject the random effects. In all of our regression results, we rejected the null hypothesis, justifying our use of fixed-effects. The results of the test statistics are available upon request.

A. GENDER EQUALITY

We discuss first the results for the gender equality measures of educational enrollment corresponding to lower and upper primary and secondary school, and for different econometric specifications corresponding to one-way (or cross-section) and two-way (or cross-section and time) fixed effects and to GMM.

Table 4 presents the results of our basic specification, with gender budgeting specified as a contemporaneous dummy variable. The first two columns of results are for the dependent variable of the female to male enrollment ratio for lower primary school, with the first column presenting the one-way and the second column, the two-way fixed effects. The third and fourth columns refer to upper primary school, and the remaining four columns refer to lower and upper secondary school. We find that the gender budgeting dummy is positive and significant only in the regression equations where lower and upper primary school gender equality indices are the dependent variable, and for the one-way fixed effects. Nonetheless, the coefficients are similar in size in the two-way fixed effects specifications.[18] The positive coefficient is consistent with our prior that gender budgeting should lead to more gender equality in education. The coefficient size, implying an improvement of 2 to 3 percentage points in the index is plausible. For the secondary school gender equality indices (either the lower or upper secondary school variants), the gender budgeting dummy is not significant. The different effect across primary and secondary school variables may reflect that the focus of gender budgeting efforts in education is on primary education.

The remaining variables show some inconsistent patterns of significance and sign. Income is positive and significant only in the regression equations where the dependent variable is secondary school, in the one-way fixed effects specification. Transfers from the center are not significant in any of the equations. These results suggest that growth in income and central government transfers are insufficient to generate equality of enrollment on the own, an important finding, which other studies have found in different contexts.[19] Population is positive and significant in the lower primary and lower secondary school equations, while the sectoral shares are by and large not significant.

Table 5 presents results with the gender budgeting dummy variable lagged two periods, to account for the plausible possibility that it takes some time for the influence of gender budgeting to manifest itself on enrollment outcomes. The results strengthen our basic finding of the positive effect of gender budgeting. We obtain a positive and significant coefficient on the gender dummy variable for lower and upper primary schooling, with the cross-section fixed effects, as before, but also obtain a significant effect with the two-way panel, including

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[18] The coefficients are significant when we do not correct for heteroskedasticity using STATA's robust option.

[19] Duflo (2012) reviews some of these studies.

Table 4. Impact of Gender Budgeting on Gender Equality, with Fixed Effects

VARIABLES	(1) Gender equality index: lower primary school (female to male ratio)		(2) Gender equality index: upper primary school (female to male ratio)		(3) Gender equality index: lower secondary school (female to male ratio)		(4) Gender equality index: upper secondary school (female to male ratio)	
	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way
Gender budgeting indicator	**0.024***	0.020	**0.031***	0.029	0.005	0.002	-0.005	-0.024
	(0.012)	(0.013)	(0.018)	(0.018)	(0.021)	(0.023)	(0.025)	(0.027)
Real transfers from center per capita (log terms)	0.013	-0.002	0.031	-0.001	0.010	-0.008	0.099	0.039
	(0.024)	(0.028)	(0.039)	(0.042)	(0.044)	(0.062)	(0.061)	(0.054)
Real income per capita (log terms)	0.018	-0.002	0.054	-0.059	0.156***	0.097	0.233***	-0.304
	(0.029)	(0.048)	(0.038)	(0.084)	(0.046)	(0.151)	(0.073)	(0.208)
Population (millions)	0.002**	0.002*	0.003	0.002	0.010**	0.009*	-0.000	-0.005
	(0.001)	(0.001)	(0.002)	(0.002)	(0.005)	(0.005)	(0.005)	(0.005)
Agriculture GDP (percent of state GDP)	0.001	-0.000	0.002	0.002	-0.002	-0.003	0.002	-0.000
	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.005)
Manufacturing GDP (percent of state GDP)	-0.000	-0.001	0.000	0.001	-0.001	-0.000	-0.001	0.002
	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
Services GDP (percent of state GDP)	0.002	0.001	0.004*	0.002	0.002	0.001	0.001	-0.005
	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.005)
Constant	0.485*	0.911*	-0.222	1.297	-1.288**	-0.452	-2.577***	4.213*
	(0.275)	(0.470)	(0.337)	(0.878)	(0.525)	(1.931)	(0.594)	(2.461)
Observations	280	280	280	280	168	168	168	168
R-squared	0.266	0.294	0.392	0.431	0.340	0.371	0.367	0.492
Number of States	28	28	28	28	28	28	28	28
State FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE		YES		YES		YES		YES

Source: Authors' estimates based on data from CEIC India Premium Database and Ministry of Women and Child Development (2015).

Note: Robust standard errors in parenthesis. Year dummies are not reported but are available upon request.

***, **, * indicate significance at 1%, 5%, and 10% respectively.

Table 5. Impact of Gender Budgeting on Gender Equality, with Lagged Gender Budgeting Dummy

VARIABLES	(1) Gender equality index: lower primary school (female to male ratio)		(2) Gender equality index: upper primary school (female to male ratio)		(3) Gender equality index: lower secondary school (female to male ratio)		(4) Gender equality index: upper secondary school (female to male ratio)	
	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way
Gender budgeting indicator**(T-2)**	**0.037****	**0.033****	**0.034***	0.029	-0.007	-0.008	-0.001	-0.004
	(0.015)	(0.015)	(0.018)	(0.019)	(0.022)	(0.023)	(0.020)	(0.019)
Real transfers from center per capita (log terms)	0.019	-0.001	0.036	-0.002	0.008	-0.012	0.098*	0.042
	(0.025)	(0.028)	(0.040)	(0.044)	(0.043)	(0.061)	(0.056)	(0.054)
Real income per capita (log terms)	0.006	-0.009	0.049	-0.058	0.170***	0.106	0.232***	-0.303
	(0.032)	(0.048)	(0.042)	(0.086)	(0.056)	(0.151)	(0.079)	(0.207)
Population (millions)	0.002**	0.002*	0.003	0.002	0.010*	0.009*	-0.000	-0.004
	(0.001)	(0.001)	(0.002)	(0.002)	(0.005)	(0.005)	(0.004)	(0.005)
Agriculture GDP (percent of state GDP)	0.000	0.000	0.001	0.002	-0.003	-0.003	0.002	-0.000
	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)
Manufacturing GDP (percent of state GDP)	-0.000	-0.001	0.000	0.001	-0.001	-0.000	-0.002	0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
Services GDP (percent of state GDP)	0.001	0.001	0.003	0.002	0.002	0.002	0.001	-0.005
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)	(0.005)
Constant	0.618**	0.981**	-0.171	1.302	-1.435**	-0.547	-2.556***	4.175*
	(0.289)	(0.460)	(0.366)	(0.913)	(0.639)	(1.943)	(0.676)	(2.446)
Observations	280	280	280	280	168	168	168	168
R-squared	0.304	0.323	0.395	0.429	0.341	0.372	0.367	0.487
Number of States	28	28	28	28	28	28	28	28
State FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE		YES		YES		YES		YES

Sources: Authors' estimates based on data from CEIC Premium India database and Ministry of Women and Child Development (2015).

Note: Robust standard errors in parenthesis. Year dummies are not reported but are available upon request. (T-2) refers to a two year delayed effect of gender budgeting.

***, **, * indicate significance at 1%, 5%, and 10% respectively.

time fixed effects, for lower primary school. Compared to the earlier results, the coefficient on the dummy variable is somewhat larger, though still plausible. Otherwise, the results are somewhat similar to the earlier results, with a muted effect of income. However, we find here that real transfers have a positive and significant effect on gender equality for upper secondary school.

Table 6 presents another variation, where we replace central transfers with real spending. In this variation, we revert to the contemporaneous gender budgeting dummy. We find that the gender budgeting dummy is positive and significant only for lower primary school. In contrast to the earlier results, the real expenditure is strongly significant for lower primary school regression, in both the cross-section and two-way fixed effects specifications and also in the upper primary school regression, in the cross-section fixed effects specification. It is notable that the gender budgeting dummy remains significant, at least in one specification, even where spending is added as an explanatory variable, suggesting support to the idea that gender budgeting efforts have a distinct effect on gender equality in school enrollment beyond increasing spending.

Table 7 presents the results of the GMM estimations, using STATA's two-step difference and system estimators. The data are averaged over two years to reduce the number of instruments to less than the number of groups. We specify the regression equation with the addition of a lagged dependent variable and a contemporaneous gender budgeting indicator. Interestingly, we find a consistent positive and significant effect of the lagged dependent variable. In addition, we find a consistently positive and significant effect of the gender budgeting dummy variable, with coefficients that are a bit larger than any of the fixed effects specifications but still plausible in magnitude. The other explanatory variables are not significant.

Overall, the results consistently suggest the gender budgeting efforts in Indian states have a positive effect on gender equality in primary education. The various specifications differ in terms of significance and size of the effect. The results are consistent with the qualitative studies we cited earlier of the Indian states' gender budgeting efforts, which suggest also that gender budgeting has had a positive influence on gender equality in education using approaches that do not control for other factors. No significant effect of gender budgeting is found for secondary education. The gender budgeting dummy variable is not significant in any specification. It is also interesting to note the weak effect of central government transfers and income in leading to more gender equality in enrollment in education, suggesting that income growth alone is insufficient and that the government needs to take specific and focused steps to ensure that India moves toward gender equality in the critical area of educational equality.

Table 6. Impact of Gender Budgeting on Gender Equality, with Expenditure Specification

VARIABLES	(1) Gender equality index: lower primary school (female to male ratio)		(2) Gender equality index: upper primary school (female to male ratio)		(3) Gender equality index: lower secondary school (female to male ratio)		(4) Gender equality index: upper secondary school (female to male ratio)	
	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way
Gender budgeting indicator	**0.022***	0.018	0.028	0.028	0.005	0.003	-0.005	-0.024
	(0.012)	(0.013)	(0.017)	(0.018)	(0.020)	(0.023)	(0.024)	(0.028)
Real total expenditure per capita (log terms)	0.075***	0.080***	0.097**	0.057	0.055	0.069	0.173	0.060
	(0.017)	(0.027)	(0.045)	(0.055)	(0.073)	(0.077)	(0.111)	(0.073)
Real income per capita (log terms)	-0.030	-0.011	0.009	-0.065	0.122	0.068	0.186*	-0.294
	(0.020)	(0.041)	(0.048)	(0.081)	(0.079)	(0.181)	(0.097)	(0.215)
Population (millions)	0.003***	0.003***	0.004*	0.002	0.009*	0.009*	-0.001	-0.005
	(0.001)	(0.001)	(0.002)	(0.002)	(0.005)	(0.005)	(0.004)	(0.005)
Agriculture GDP (percent of state GDP)	0.001	0.000	0.002	0.002	-0.003	-0.003	0.001	-0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)
Manufacturing GDP (percent of state GDP)	0.000	-0.001	0.001	0.001	-0.001	0.000	-0.002	0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)	(0.003)	(0.004)
Services GDP (percent of state GDP)	0.001	-0.000	0.003	0.002	0.001	0.000	-0.001	-0.006
	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.005)
Constant	0.392	0.246	-0.389	0.829	-1.305**	-0.815	-2.706***	3.913
	(0.274)	(0.597)	(0.356)	(1.011)	(0.552)	(1.767)	(0.613)	(2.342)
Observations	280	280	280	280	168	168	168	168
R-squared	0.297	0.321	0.411	0.437	0.343	0.374	0.371	0.492
Number of States	28	28	28	28	28	28	28	28
State FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE		YES		YES		YES		YES

Sources: Authors' estimates based on data from CEIC India Premium Database and Ministry of Women and Child Development (2015).

Note: Robust standard errors in parenthesis. Year dummies are not reported but are available upon request.

***, **, * indicate significance at 1%, 5%, and 10% respectively.

Table 7. Impact of Gender Budgeting on Gender Equality, with GMM and Lagged Dependent Variable

VARIABLES	(1) Gender equality index: lower primary school (female to male ratio)				(2) Gender equality index: upper primary school (female to male ratio)			
	Difference GMM (Two-step)		System GMM (Two-step)		Difference GMM (Two-step)		System GMM (Two-step)	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Lagged dependent variable	0.378**	0.384**	0.378**	0.468*	0.852***	0.802***	0.852***	0.685*
	(0.172)	(0.187)	(0.172)	(0.269)	(0.208)	(0.268)	(0.208)	(0.391)
Gender budgeting indicator	**0.046*****	**0.049***	**0.046*****	**0.051***	**0.046*****	**0.050*****	**0.046*****	**0.042****
	(0.014)	(0.025)	(0.014)	(0.026)	(0.014)	(0.016)	(0.014)	(0.021)
Real transfers from center per capita (log terms)	0.006	0.094	0.006	-0.012	-0.068	-0.083	-0.068	-0.063
	(0.045)	(0.091)	(0.045)	(0.113)	(0.054)	(0.083)	(0.054)	(0.075)
Real income per capita (log terms)	-0.010	-0.192	-0.010	-0.045	0.017	-0.264	0.017	-0.225
	(0.056)	(0.172)	(0.056)	(0.191)	(0.053)	(0.174)	(0.053)	(0.167)
Population (millions)	0.005	0.006	0.005	0.004	0.002	0.002	0.002	0.004
	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Agriculture GDP (percent of state GDP)	0.001	-0.002	0.001	0.001	-0.005	-0.001	-0.005	-0.002
	(0.003)	(0.005)	(0.003)	(0.004)	(0.004)	(0.008)	(0.004)	(0.009)
Manufacturing GDP (percent of state GDP)	0.004	0.003	0.004	0.001	-0.002	0.001	-0.002	-0.000
	(0.004)	(0.005)	(0.004)	(0.003)	(0.003)	(0.006)	(0.003)	(0.007)
Services GDP (percent of state GDP)	-0.001	-0.009	-0.001	0.003	-0.002	-0.006	-0.002	0.000
	(0.004)	(0.006)	(0.004)	(0.008)	(0.003)	(0.008)	(0.003)	(0.012)
Observations	84	84	112	112	84	84	112	112
Number of States (Groups)	28	28	28	28	28	28	28	28
Number of Instruments	23	23	24	27	23	23	24	27
AR (2) (p-values)	0.31	0.72	0.31	0.28	0.78	0.35	0.78	0.78
Hansen J (p-values)	0.41	0.48	0.41	0.16	0.64	0.43	0.64	0.36

Sources: Authors' estimates based on data from CEIC India Premium Database and Ministry of Women and Child Development (2015).

Note: Windmeijer bias-corrected robust standard errors in parenthesis. (a) Time dummies are not included. (b) Time dummies are included to capture period specific effects but not reported (available upon request). Estimates are based on using a 2-year average panel (2002-2011).

***, **, * indicate significance at 1%, 5%, and 10% respectively.

B. FISCAL SPENDING

The second part of our empirical work examines the effect of gender budgeting on fiscal spending. Gender budgeting efforts, as noted, take many different forms, and although they might lead to a higher level of spending, they could focus instead on restructuring or reallocating spending among programs rather than just increasing spending. However, in view of the relatively low level of public spending in Indian states, the achievement of gender-related objectives is unlikely to be achieved without some greater allocation of public funds to key gender-related objectives.

Table 8 presents the results for fiscal spending as a dependent variable. The first two columns present the results for total spending, while the remaining columns capture social services, education, health, welfare, and infrastructure. By using natural logs for the spending, transfers, and income, the coefficients on the transfers and income variables can be interpreted as transfers or income elasticities of spending.

We find that for most of the fiscal spending measures the gender budgeting dummy is not significant, but notably, it is significant for infrastructure spending, in both the cross-section and two-way fixed effects specifications.[20] This suggests that gender budgeting in Indian states has had an expansive effect on infrastructure spending. This result is not inconsistent with the results of the more qualitative studies, which suggested that infrastructure was an important concern of women, especially that related to clean water and sanitary facilities as well as safer means to travel.

The other variables yield results that are supportive of the overall validity of the model, coming in general terms from the theoretical specification for the demand for public spending. Transfers from the center and real income per capita have a positive and significant effect on spending, as the theory would suggest, in almost all the specifications. For the one-way fixed effects specifications, these two variables are always significant, while for the two-way fixed effects, in a few cases, they are not. The implied income elasticities vary across the different forms of spending. The elasticities for income tend to be higher than for transfers, and the welfare and infrastructure spending areas have higher elasticities than the other subcomponents of spending. The two-way fixed effects results tend to imply smaller elasticities than the one-way fixed effects. The population variable is negative and significant, but not consistently so, suggesting there may be some degree of economies of scale. Notably, in the overall spending category, the population coefficient is negative and

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[20] We also investigate the effect of gender budgeting on allocation of funds across sectors by specifying the dependent variable as sectoral spending as a percentage of total expenditure. Our findings are similar to those presented on fiscal spending per capita, presented here.

Table 8. Impact of Gender Budgeting on Fiscal Spending, with Fixed Effects

	Real expenditure per capita (log terms)											
	(1)		(2)		(3)		(4)		(5)		(6)	
VARIABLES	Total		Social services		Education		Health		Welfare		Infrastructure	
	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way
Gender budgeting indicator	0.014	0.016	-0.004	-0.005	0.026	0.041	0.010	0.003	-0.086	-0.097	**0.128****	**0.099***
	(0.030)	(0.026)	(0.029)	(0.029)	(0.036)	(0.032)	(0.035)	(0.038)	(0.067)	(0.071)	(0.051)	(0.052)
Real transfers from center per capita (log terms)	0.293***	0.219***	0.340***	0.334***	0.209**	0.302***	0.231**	0.120	0.549***	0.500***	0.543***	0.372***
	(0.076)	(0.069)	(0.095)	(0.105)	(0.099)	(0.105)	(0.103)	(0.112)	(0.144)	(0.139)	(0.125)	(0.116)
Real income per capita (log terms)	0.572***	0.218	0.637***	0.366**	0.709***	0.446**	0.725***	0.279	0.751***	0.272	0.256*	0.158
	(0.072)	(0.167)	(0.081)	(0.149)	(0.088)	(0.187)	(0.103)	(0.235)	(0.131)	(0.258)	(0.131)	(0.251)
Population (millions)	-0.007	-0.009**	-0.000	-0.003	-0.003	-0.005	-0.004	-0.007	0.010	0.005	-0.014**	-0.015**
	(0.004)	(0.004)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.009)	(0.009)	(0.005)	(0.006)
Agriculture GDP (percent of state GDP)	-0.005	-0.008**	-0.002	-0.010***	0.002	-0.010***	0.006	0.002	0.009	-0.004	-0.021***	-0.017**
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)	(0.006)	(0.009)	(0.009)	(0.007)	(0.007)
Manufacturing GDP (percent of state GDP)	-0.005	-0.005	-0.005	-0.008	0.001	-0.003	-0.007	-0.007	0.006	0.002	-0.015**	-0.013*
	(0.004)	(0.004)	(0.005)	(0.005)	(0.007)	(0.005)	(0.006)	(0.007)	(0.007)	(0.008)	(0.007)	(0.007)
Services GDP (percent of state GDP)	0.009**	0.001	0.013**	-0.002	0.017**	-0.003	0.024***	0.013**	0.020***	-0.002	-0.009**	-0.006
	(0.003)	(0.003)	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)	(0.007)	(0.008)	(0.004)	(0.006)
Constant	0.716*	5.505***	-1.983***	1.978	-2.672***	0.789	-4.561***	1.656	-7.932***	-0.921	1.603*	3.693
	(0.370)	(1.462)	(0.484)	(1.267)	(0.554)	(1.776)	(0.570)	(2.466)	(1.079)	(2.489)	(0.855)	(2.261)
Observations	351	351	351	351	351	351	351	351	351	351	351	351
R-squared	0.929	0.943	0.918	0.939	0.879	0.915	0.844	0.862	0.842	0.867	0.821	0.832
Number of states	27	27	27	27	27	27	27	27	27	27	27	27
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE		YES		YES		YES		YES		YES		YES

Sources: Authors' estimates based on data from CEIC India Premium Database and Ministry of Women and Child Development (2015).

Note: Robust standard errors in parenthesis. Year dummies are not reported but are available upon request.

***, **, * indicate significance at 1%, 5%, and 10% respectively.

significant in the two-way fixed effects and similarly for both the one-way and two-way fixed effects for infrastructure spending. The shares of different industries in the economy suggest that a higher share of agriculture may dampen spending while services increases spending, consistent with the idea that more modern industries may lead to a higher demand for public services.

Table 9 presents the results with the lagged gender budgeting indicator. As with the gender equality dependent variables, the impact of the gender budgeting, measured through the dummy variable, strengthens when the variable is specified in lagged terms. Here we find more consistency in the positive and significant effect of gender budgeting on spending, including the total spending category as well as social services, education, and infrastructure, though as with the results for the unlagged version, the coefficient is only significant in the two-way fixed effects for infrastructure spending. The remaining variables are similar to the previous results.

Finally, Table 10 presents results for the GMM estimations. The data are averaged over three years to reduce the number of instruments to less than the number of groups, a significant loss of data points. In contrast to the results with the gender equality dependent variables, the lagged dependent variable is not generally significant, except with the total spending dependent variables, for both the one-way and two-way fixed effects. Notably, the gender budgeting dummy variable is positive and significant only for the infrastructure spending, as found in Table 7, and only for the one-way fixed effects. Moreover, there tends to be a loss of significance for the transfer and income variables, as well as the population variables, though where they are significant, they have the expected positive effect (for transfers and income) and negative effect (for population). This loss of significance may reflect the averaging necessary to apply the GMM approach, thus suggesting that it may be better to focus on the results of the fixed effects.

Overall, these results suggest that gender budgeting exerts some positive effect on spending, though principally, this seems to have been on infrastructure. Other empirical findings are consistent with the underlying theory. Central transfers and income exert a positive effect on spending, as demand models would suggest, and population, a negative effect, consistent with economies of scale, though the results are not consistently significant.

Table 9. Impact of Gender Budgeting on Fiscal Spending, with Lagged Gender Budgeting Dummy

	Real expenditure per capita (log terms)											
	(1)		(2)		(3)		(4)		(5)		(6)	
VARIABLES	Total		Social services		Education		Health		Welfare		Infrastructure	
	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way	panel one-way	panel two-way
Gender budgeting indicator(**T-2**)	**0.047***	0.033	**0.065****	0.026	**0.092****	0.052	0.048	0.016	0.045	-0.018	**0.170*****	**0.171*****
	(0.027)	(0.028)	(0.027)	(0.031)	(0.040)	(0.037)	(0.039)	(0.046)	(0.068)	(0.071)	(0.051)	(0.050)
Real transfers from center per capita (log terms)	0.307***	0.227***	0.363***	0.347***	0.236**	0.309***	0.246**	0.126	0.575***	0.528***	0.584***	0.409***
	(0.074)	(0.069)	(0.093)	(0.105)	(0.097)	(0.105)	(0.101)	(0.109)	(0.142)	(0.141)	(0.128)	(0.115)
Real income per capita (log terms)	0.535***	0.205	0.567***	0.341**	0.636***	0.439**	0.684***	0.269	0.633***	0.207	0.185	0.104
	(0.075)	(0.167)	(0.087)	(0.150)	(0.095)	(0.187)	(0.102)	(0.239)	(0.139)	(0.273)	(0.145)	(0.257)
Population (millions)	-0.007*	-0.009**	-0.002	-0.003	-0.004	-0.005	-0.005	-0.007	0.007	0.004	-0.015***	-0.015***
	(0.004)	(0.004)	(0.006)	(0.006)	(0.005)	(0.005)	(0.004)	(0.005)	(0.009)	(0.009)	(0.005)	(0.005)
Agriculture GDP (percent of state GDP)	-0.006*	-0.008**	-0.003	-0.011***	0.001	-0.010**	0.005	0.002	0.007	-0.005	-0.023***	-0.018**
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.008)	(0.009)	(0.007)	(0.007)
Manufacturing GDP (percent of state GDP)	-0.005	-0.005	-0.006	-0.008	0.001	-0.003	-0.007	-0.007	0.006	0.002	-0.015**	-0.013*
	(0.004)	(0.004)	(0.006)	(0.005)	(0.007)	(0.005)	(0.006)	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)
Services GDP (percent of state GDP)	0.008**	0.001	0.012**	-0.002	0.015**	-0.003	0.023***	0.013**	0.020**	-0.002	-0.013***	-0.006
	(0.003)	(0.003)	(0.005)	(0.004)	(0.006)	(0.006)	(0.005)	(0.005)	(0.008)	(0.008)	(0.004)	(0.006)
Constant	1.066***	5.577***	-1.309**	2.145*	-1.977***	0.809	-4.170***	1.722	-6.784***	-0.428	2.248**	3.985*
	(0.357)	(1.444)	(0.537)	(1.242)	(0.624)	(1.748)	(0.570)	(2.489)	(1.185)	(2.666)	(0.886)	(2.261)
Observations	351	351	351	351	351	351	351	351	351	351	351	351
R-squared	0.930	0.943	0.920	0.939	0.884	0.916	0.845	0.862	0.841	0.864	0.828	0.842
Number of states	27	27	27	27	27	27	27	27	27	27	27	27
State FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE		YES		YES		YES		YES		YES		YES

Sources: Authors' estimates based on data from CEIC India Premium Database and Ministry of Women and Child Development (2015).

Note: Robust standard errors in parenthesis. Year dummies are not reported but are available upon request. (T-2) refers to a two year delayed effect of gender budgeting.

***, **, * indicate significance at 1%, 5%, and 10% respectively.

Table 10. Impact of Gender Budgeting on Fiscal Spending, with GMM and Lagged Dependent Variable

	(1)		(2)		(3)		(4)		(5)		(6)	
VARIABLES	Total expenditure (real per capita in log terms)		Social expenditure (real per capita in log terms)		Education expenditure (real per capita in log terms)		Health expenditure (real per capita in log terms)		Welfare expenditure (real per capita in log terms)		Infrastructure expenditure (real per capita in log terms)	
	System GMM (Two-step)		System GMM (Two-step)		System GMM (Two-step)		System GMM (Two-step)		System GMM (Two-step)		System GMM (Two-step)	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Lagged dependent variable	0.256	0.616*	0.300	0.263	0.729	0.262	-0.015	0.230	0.178	0.233	0.091	0.505**
	(0.338)	(0.346)	(0.274)	(0.313)	(0.539)	(0.296)	(0.309)	(0.279)	(0.151)	(0.246)	(0.287)	(0.255)
Gender budgeting indicator	-0.015	0.069	-0.105	-0.003	-0.189	0.010	0.155	0.053	-0.307	0.091	**0.250***	0.238
	(0.112)	(0.100)	(0.147)	(0.184)	(0.291)	(0.145)	(0.123)	(0.186)	(0.250)	(0.249)	(0.132)	(0.162)
Real transfers from center per capita (log terms)	0.266	0.346	0.588*	0.817*	-0.270	0.547	0.333	0.041	0.927**	1.031	1.033***	0.559
	(0.216)	(0.285)	(0.305)	(0.435)	(0.315)	(0.368)	(0.450)	(0.376)	(0.449)	(0.707)	(0.339)	(0.545)
Real income per capita (log terms)	0.247	0.480	0.177	0.154	0.683	-0.534	0.662*	1.187	0.615	1.331	-0.783	0.650
	(0.327)	(0.797)	(0.322)	(0.947)	(0.476)	(0.845)	(0.391)	(0.896)	(0.544)	(1.289)	(0.523)	(1.441)
Population (millions)	-0.005	-0.003	0.003	0.013	0.001	-0.003	-0.011	0.002	0.037	0.030	0.000	0.003
	(0.009)	(0.009)	(0.012)	(0.021)	(0.010)	(0.008)	(0.016)	(0.017)	(0.031)	(0.035)	(0.021)	(0.013)
Agriculture GDP (percent of state GDP)	-0.002	0.001	-0.011	-0.033**	-0.023	-0.026	0.005	0.001	-0.006	-0.006	-0.030	-0.009
	(0.011)	(0.013)	(0.018)	(0.017)	(0.027)	(0.027)	(0.016)	(0.025)	(0.033)	(0.028)	(0.031)	(0.030)
Manufacturing GDP (percent of state GDP)	-0.020	-0.006	0.004	0.006	-0.005	-0.008	-0.039	-0.005	0.078	0.062**	-0.018	0.014
	(0.030)	(0.026)	(0.025)	(0.032)	(0.037)	(0.018)	(0.043)	(0.041)	(0.048)	(0.028)	(0.061)	(0.024)
Services GDP (percent of state GDP)	0.013	0.011	0.006	-0.014	-0.005	-0.025	0.016	0.026	0.008	0.024	-0.004	0.028
	(0.016)	(0.020)	(0.019)	(0.016)	(0.024)	(0.050)	(0.034)	(0.033)	(0.038)	(0.033)	(0.027)	(0.031)
Observations	108	108	108	108	108	108	108	108	108	108	108	108
Number of States (Groups)	27	27	27	27	27	27	27	27	27	27	27	27
Number of Instruments	24	27	24	27	24	27	24	27	24	27	24	27
AR (2) (p-values)	0.28	0.22	0.78	0.66	0.74	0.14	0.49	0.44	0.49	0.83	0.68	0.18
Hansen J (p-values)	0.27	0.26	0.12	0.1	0.21	0.1	0.38	0.45	0.76	0.32	0.74	0.2

Sources: Authors' estimates based on data from CEIC India Premium Database and Ministry of Women and Child Development (2015).

Note: Windmeijer bias-corrected robust standard errors in parenthesis. (a) Time dummies are not included. (b) Time dummies are included to capture period specific effects but not reported (available upon request). Estimates are based on using a 3-year average panel (2002-2014).

***, **, * indicate significance at 1%, 5%, and 10% respectively.

VII. CONCLUSION AND POLICY IMPLICATIONS

Our study assesses the effect of gender budgeting in India, using state level variation to capture the relationships between gender budgeting, measured as a dummy variable, and two sets of dependent variables, representing gender equality indices, measured by female to male enrollment ratios in different levels of schooling, and fiscal spending variables. Although there are a number of studies on the effectiveness of gender budgeting in India, none of them are quantitative in nature. Most of the gender budgeting literature eschews quantitative approaches to the assessment of the effects of these initiatives. Thus, this study adds to the literature on gender budgeting an important quantitative dimension. India's context is also useful for approaching this analysis in that Indian states adopted gender budgeting at different points in time since the early 2000 period and high quality data are available on key variables, including school enrollment and fiscal spending.

We find that with both approaches, where the dependent variables are specified as gender equality indices for school enrollment and spending, there is a mixed pattern of significance. With great consistency, we find that gender budgeting is positive and significant for primary school enrollment equality, suggesting a positive role for gender budgeting in improving gender equality in this regard. For secondary school enrollment, the sample is considerably smaller and we do not obtain a significant coefficient on the gender budgeting dummy. For spending, we find that the gender budgeting dummy variable is significant only for infrastructure spending. This result suggests that if gender budgeting is improving gender equality in education, it is working through a means other than higher spending on education, itself. Perhaps it has led to more focused spending on girls or some other change in incentive, but unfortunately, we cannot identify this channel with the data at hand. The positive result on infrastructure spending could be linked to gender equality if this infrastructure were targeting improved school buildings and related educational infrastructure. Again, however, we would need a finer disaggregation to make this specific link. The results for the other variables are supportive of the underlying theoretical basis for demand models of public spending. Higher income and a stronger revenue base support higher spending. Interestingly, however, higher income does not necessarily lead to greater gender equality in enrollment, suggesting the importance of governments undertaking specific programs to address gender equality, beyond expecting that as income rises, gender equality would necessarily evolve in lockstep.

We have tried through the various econometric specifications to convince the reader that the positive coefficient on the gender budgeting dummy variables represents the genuine effect of these efforts. The control for state and time fixed effects, population, income, fiscal revenues, and economic structure encompass many of the controls one would find in related specifications. However, admittedly, with more years of data and more disaggregated data

and information on the gender budgeting efforts, it would be possible to refine the specification further.

We hope that this paper provides an impetus to further quantitative evaluation of gender budgeting with an eye to helping shape these these efforts to accomplish their intended goals of gender equality.

REFERENCES

Biswas, R., S. Marjit, and V. Marimoutou, 2010, "Fiscal Federalism, State Lobbying and Discretionary Finance: Evidence from India," *Economics and Politics*, Vol. 22, pp. 68-91.

Bradford, W., and W.E. Oates, 1971, "Towards a Predictive Theory of Intergovernmental Grants," *American Economic Review*, Vol. 61, pp. 440-448.

Cashin, P.A., and Sahay, R., 1995, "Internal Migration, Center-State Grants and Economic Growth in the States of India," *Staff Papers (International Monetary Fund)*, Vol. 43, pp. 123-171.

Centre for Budget and Governance Accountability, 2012, *Recognising Gender Biases: Rethinking Budgets* (New Delhi: Centre for Budget and Governance Accountability).

Chakraborty, L., 2010, "Determining Gender Equity in Fiscal Federalism: Analytical Issues and Empirical Evidence from India," *Levy Economics Institute Working Paper* No. 590.

Chakraborty, L., 2016, "Asia: A Survey of Gender Budgeting Experiences," International Monetary Fund Working Paper 16/150 (Washington, DC: IMF).

Chakraborty, P., 2016, "Restructuring Central Grants: Balancing Fiscal Autonomy and Fiscal Space," Economic and Political Weekly, Vol. 51, Feb 6, 2016, pages 15-19.

Chakraborty, P., and M. Gupta, 2016, "Evolving Centre-State Financial Relations: Role of the New Framework for Grants," Economic and Political Weekly, Budget Special Issue, Vol. 51, Apr 16, 2016, pages 43-46.

Dahlberg, M., E. Mörk, J. Rattsø, and H. Ågren, 2008, "Using a Discontinuous Grant Rule to Identify the Effect of Grants on Local Taxes and Spending," *Journal of Public Economics*, Vol. 92, pp. 2320-2335.

Das, S., S. Jain-Chandra, K. Kochhar, and N. Kumar, 2015, "Women Workers in India: Why So Few Among So Many," International Monetary Fund, Working Paper No. 55 (Washington, DC: IMF).

Duflo, E., 2012, "Women Empowerment and Economic Development," *Journal of Economic Literature*, Vol. 50, pp. 1051-1079.

Hindricks, J., and G. D. Myles, 2006, *Intermediate Public Economics* (Cambridge, MA: MIT Press).

Hines, J. R., and R. H. Thaler, 1995, "Anomalies: the Flypaper Effect," *Journal of Economic Perspectives*, Vol. 9, pp. 217-226.

Jha, R., 2014, "India: Redesigning Fiscal Federalism after the Global Financial Crisis," ASARC Working Paper 2014/07.

Joshi, S. B., 2013, *Assessing Gender Equality Investments: A Multi-State Perspective* (New Delhi: UN Women and National Foundation for India).

Kaur, B., and S. Misra, 2003, "Social Sector Expenditure and Attainments: An Analysis of Indian States," *Reserve Bank of India Occasional* Papers, Vol. 24.

Khera, P., 2016, "Macroeconomic Impacts of Gender Inequality and Informality in India," International Monetary Fund Working Paper, 16 (Washington, DC: IMF).

Ministry of Women and Child Development, 2015, *Gender Budgeting Handbook* (New Delhi: Government of India).

Mundle, S., S. Chowdhury, and S. Sikdar, 2016, "Governance Performance of Indian States, 2001-02 to 2010-11," National Institute of Public Finance and Policy Working Paper No. 164 (New Delhi: NIPFP).

Rao, M. G., 2009, "Fiscal Federalism in India—Trends and Reform," Chapter V in S. Ichimura and R. Bahl, eds., *Decentralization Policies in Asian Development* (Hackensack, NJ: World Scientific Press), pp. 107-140.

Stotsky, J.G., 2016, "Gender Budgeting: Fiscal Overview and Current Outcomes," IMF Working Paper 16/149 (Washington, DC: IMF).

Vaishnav, M. and Swanson, R., 2015, "Does Good Economics Make for Good Politics? Evidence from Indian States," *India Review*, Vol. 14, pp. 279-311.

World Bank, 2011, *World Development Report 2012: Gender Equality and Development* (Washington, DC: World Bank).

Table A1. Gender Budgeting States vs. Non-Gender Budgeting States

Indian states	Year of implementation
Gender budgeting states	
Arunachal Pradesh	2007
Bihar	2008
Chhattisgarh	2007
Gujarat	2006
Himachal Pradesh	2008
Jammu and Kashmir	2007
Karnataka	2006
Kerala	2008
Madhya Pradesh	2007
Maharashtra	2013
Nagaland	2009
Odisha	2004
Rajasthan	2011
Tripura	2005
Uttarakhand	2007
Uttar Pradesh	2005
Non-gender budgeting states	
Andhra Pradesh	
Assam	
Goa	
Haryana	
Jharkhand	
Manipur	
Meghalaya	
Mizoram	
Punjab	
Sikkim	
Tamil Nadu	
Telangana	
West Bengal	

Source: Ministry of Women and Child Development (2015).

Table A2. Variables Used in this Study

Variables	Years
Total expenditure	1991-2015
Expenditure: social services	1991-2015
Expenditure: education	1991-2015
Expentiture: health	1991-2015
Expenditure: welfare	1991-2015
Expenditure: infrastructure	1991-2015
Total revenue	1991-2015
Revenue: total tax	1991-2015
Revenue: tax (shared taxes from center)	1991-2015
Revenue: total non-tax	1991-2015
Revenue: non-tax (grants from center)	1991-2015
Nominal GDP	1981-2015
Real GDP	1981-2015
Agriculture GDP	1981-2015
Manufacturing GDP	1981-2015
Services GDP	1981-2015
Gender equality index: primary school	2001-2011
Gender equality index: secondary school	2006-2011
Population	1994-2015

Source: CEIC India Premium Database.

Table A3. Correlation Matrix of the Gender Inequality Sample

	Gender budgeting indicator	Gender equality index: lower primary school	Gender equality index: upper primary school	Gender equality index: lower secondary school	Gender equality index: upper secondary school	Real transfers from center per capita (log terms)	Real income per capita (log terms)	Population (millions)	Agriculture GDP (percent of state GDP)	Manufacturing GDP (percent of state GDP)	Services GDP (percent of state GDP)
Gender budgeting indicator	1										
Gender equality index: lower primary school	0.0997	1									
Gender equality index: upper primary school	0.0099	0.6632*	1								
Gender equality index: lower secondary school	-0.2743*	0.3347*	0.7543*	1							
Gender equality index: upper secondary school	-0.1895*	0.2902*	0.5784*	0.7417*	1						
Real transfers from center per capita (log terms)	0.1696*	-0.0279	0.3671*	0.3725*	0.1478	1					
Real income per capita (log terms)	0.1388*	0.4274*	0.4840*	0.5060*	0.5533*	0.1644*	1				
Population (millions)	0.1310*	-0.0495	-0.3483*	-0.4638*	-0.2978*	-0.5541*	-0.2568*	1			
Agriculture GDP (percent of state GDP)	-0.0499	-0.0176	-0.2159*	-0.2513*	-0.4273*	-0.103	-0.5205*	0.2182*	1		
Manufacturing GDP (percent of state GDP)	-0.0116	0.0816	-0.1198*	-0.1342	0.0788	-0.5646*	0.3650*	0.1934*	-0.4814*	1	
Services GDP (percent of state GDP)	-0.1270*	0.0849	0.2411*	0.2427*	0.3103*	-0.0536	-0.0408	0.1998*	-0.1316*	-0.3045*	1

Sources: Authors' estimates based on data from CEIC India Premium Database and Ministry of Women and Child Development (2015).

Note: * indicates significance at 5% or less respectively.

Table A4. Correlation Matrix of the Fiscal Spending Sample

	Gender budgeting indicator	Total expenditure (real per capita in log terms)	Social expenditure (real per capita in log terms)	Education expenditure (real per capita in log terms)	Health expenditure (real per capita in log terms)	Welfare expenditure (real per capita in log terms)	Infrastructure expenditure (real per capita in log terms)	Real transfers from center per capita (log terms)	Real income per capita (log terms)	Population (millions)	Agriculture GDP (percent of state GDP)	Manufacturing GDP (percent of state GDP)	Services GDP (percent of state GDP)
Gender budgeting indicator	1												
Total expenditure (real per capita in log terms)	0.0645	1											
Social expenditure (real per capita in log terms)	0.1083*	0.9710*	1										
Education expenditure (real per capita in log terms)	0.0993	0.9511*	0.9755*	1									
Health expenditure (real per capita in log terms)	0.0743	0.9588*	0.9548*	0.9400*	1								
Welfare expenditure (real per capita in log terms)	0.1861*	0.7888*	0.8409*	0.7746*	0.7335*	1							
Infrastructure expenditure (real per capita in log terms)	0.1076*	0.9119*	0.9090*	0.8650*	0.8639*	0.7475*	1						
Real transfers from center per capita (log terms)	0.1690*	0.7949*	0.7936*	0.7783*	0.7889*	0.6379*	0.7110*	1					
Real income per capita (log terms)	0.1534*	0.6579*	0.6964*	0.6884*	0.6572*	0.6082*	0.6292*	0.2057*	1				
Population (millions)	0.1566*	-0.5576*	-0.5391*	-0.5350*	-0.5649*	-0.3127*	-0.5441*	-0.5409*	-0.2441*	1			
Agriculture GDP (percent of state GDP)	0.0032	-0.3238*	-0.4148*	-0.4129*	-0.3503*	-0.4281*	-0.3210*	-0.1066*	-0.5137*	0.2320*	1		
Manufacturing GDP (percent of state GDP)	-0.0612	-0.1262*	-0.0873	-0.0935	-0.1353*	-0.0459	-0.0352	-0.4750*	0.4039*	0.1380*	-0.4857*	1	
Services GDP (percent of state GDP)	-0.0804	-0.0665	-0.0501	0.0055	-0.0397	0.0492	-0.2269*	-0.0783	-0.0393	0.2134*	-0.1527*	-0.3466*	1

Sources: Authors' estimates based on data from CEIC India Premium Database and Ministry of Women and Child Development (2015).

Note: * indicates significance at 5% or less respectively.

This section summarizes gender budgeting initiatives in ten Indian states for which we were able to obtain some specifics on their gender budgeting efforts.[21] In general, they focused their initiatives on social services sectors such as women and child development, education, health, nutrition, welfare, and infrastructure. Gender budgeting efforts across these states include development of a state policy for gender equality and adoption of gender budgeting statements in budget documents; identifying nodal departments for gender budgeting and formation of gender budgeting cells;[22]implementation of polices and programs related to gender-related objectives; and data collection and analysis.

Gujarat

Gender budgeting was adopted in 2006 in Gujarat. Gender budgeting efforts by the state included setting up of a gender budget cell, designating a nodal department for gender budgeting, adoption of a gender budget statement, creation of state policy for gender equality, creation of gender data bank, creation of gender budgeting manual for government officials, and training workshops. State policy for gender equality puts a special emphasis on developing an effective strategy to incorporate gender budgeting in various state government departments.

Jammu and Kashmir

Gender budgeting was adopted in 2007 in Jammu and Kashmir. Gender budgeting efforts by the state included increasing the focus on women's needs in state budgets; setting up of a gender budget cell and designating a nodal department for gender budgeting. Policy initiatives in this state mainly focused on women's needs in infrastructure and welfare, and women's employment.

Karnataka

Gender budgeting was adopted in 2006 in Karnataka. Gender budgeting efforts by the state included designating a nodal department for gender budgeting, adopting a gender budgeting statement, developing monitoring and evaluation schemes intended to track and analyze the

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[21] For Appendix B we obtained information from chapter 4 in CBGA (2012). Please see chapter 4 for detailed information on gender budgeting initiatives in these states. Joshi (2013) and Ministry of Women and Child Development (2015) are useful for further information on gender budgeting initiatives for a subset of these states.

[22] The purpose of these gender budgeting cells is to serve as a central body in charge of using gender budgeting as a tool for gender mainstreaming of national policies.

progress on gender equality, running capacity building activities on gender budgeting for government officers, and auditing gender budgeting activities to measure their impact.

Kerala

Gender budgeting was adopted in 2008 in Karnataka. Gender budgeting efforts by the state included designating a nodal department for gender budgeting, creating a gender advisory committee, adopting a gender budget statement, creating flagship schemes targeted towards education, women safety and protection, and skill training, a gender audit of selected flagship schemes, increasing funding for flagship schemes, promoting data collection of gender disaggregated data, and studying ways to develop a policy for gender-related goals. The state focuses heavily on infrastructure sector to improve the status of women.

Madhya Pradesh

Gender budgeting was adopted in 2007 in Madhya Pradesh. Gender budgeting efforts by the state included designating a nodal department for gender budgeting, adoption of a gender budget statement, creation of "Directorate of Women Empowerment" to oversee successful implementation of women's empowerment schemes, including women's group and civil society in budget consultations, and mandating the inclusion of gender-related objectives in all project reports. Madhya Pradesh also collected micro-level sex-disaggregated data and performed gender analysis to study the impact of several schemes and programs.

Nagaland

Gender budgeting was adopted in 2009 in Nagaland. Gender budgeting efforts by the state included designating a nodal department for gender budgeting, creating a gender core committee in charge of broadening gender policy and engaging non-government institutions, creating a gender budgeting task force in charge of integrating gender in state and district plans and producing a gender budgeting manual, and capacity building activities for gender awareness.

Odisha

Gender budgeting was adopted in 2004 in Odisha. Gender budgeting efforts by the state included adoption of a gender budget statement, creation of "Women Component Plan" under which 30 percent of funds in the "Annual Plan" are reserved for women, designating a nodal department for gender budgeting, creating a budget document with a gender budgeting section, capacity building workshops, drawing up a gender budgeting handbook, and developing a state policy for girls and women with a focus on survival, health and nutrition, education, livelihood, asset ownership, decision making, participation and political representation, and safety, security, and protection.

Rajasthan

Gender budgeting was adopted in 2011 in Rajasthan. Gender budgeting efforts by the state included the constitution of a high level committee, setting up of a gender budget cell, designating a nodal department for gender budgeting, capacity building workshops, adoption of a gender budget statement, and gender appraisal of budget proposals. These appraisals were carried out by government departments that focused on Women and Children's Development, Education, Medical and Health, Social Justice and Empowerment, Rural Development, and Agriculture and Animal Husbandry. Gender budgeting workshops were mainly organized in the Women and Child Development, Planning, Finance, and Education departments. In addition to that, gender desks were established across 71 government departments.

Tripura

Gender budgeting was adopted in 2005 in Tripura. Gender budgeting efforts by the state included setting up of gender budget cells across 18 state government departments, designating a nodal department for gender budgeting, adopting a gender budget statement in the budget, and adopting various schemes for women intended to empower women and girls. The schemes have mainly focused on education, social welfare, and job skills.

Uttarakhand

Gender budgeting was adopted in 2007 in Uttarakhand. Gender budgeting efforts by the state included the adoption of a gender budget statement, setting up of a gender budget cell, designating a nodal department for gender budgeting, and capacity building workshops for gender awareness across different state government departments. Gender budget statements provided a platform to track the budget for women schemes resulting in a significant increase between 2007 and 2014 in spending on women-related goals.

We use probit analysis to assess the determinants of the decision to adopt gender budgeting. Table B1 below reports our results that confirm our hypothesis that adoption of gender budgeting is related to political rather than economic variables. Our model uses a restricted sample of 14 states due to data limitations. It includes 9 gender budgeting states and 5 non-gender budgeting states because only 14 states out of 28 states had data for all the determinants of gender budgeting that we include in our model.

Political variables are drawn from Vaishnav and Swanson (2015). The BJP alliance is a binary indicator that takes a value of 1 when the incumbent government is headed by the Bharatiya Janata Party (BJP) and 0 otherwise. The INC alliance is a binary indicator that takes a value of 1 when the incumbent government is headed by the Indian National Congress (INC) and 0 otherwise. The Left alliance is a binary indicator that takes a value of 1 when the incumbent government is headed by the Communist Party of India and 0 otherwise. The governance performance index (GPI), literacy rate, and crime rate are drawn from Mundle et al. (2016). The paper covers 19 major states and reports the data for these variables for each state in 2001 and 2011. Therefore we fill in the missing data through linear interpolation. The GPI measures the quality of governance by using a wide range of indicators that reflect infrastructure services; social services; fiscal performance; justice, law, and order; and quality of the legislature. Please see Mundle et al. (2016) for further detail on how the index is constructed. Population data are drawn from CEIC Indian premium database while population density and the female to male population ratio are computed using data from the CEIC. The coastal indicator is a dummy variable that takes the value of 1 if the state is coastal and 0 if the state is inland.

We find the result that the only significant indicators of gender budgeting adoption are the political party variables. The BJP alliance is positively linked to adoption and the communist party alliance, negatively linked. The INC does not have a significant link to adoption.

Table C1. Probit Analysis on the Adoption of Gender Budgeting

	(1)
VARIABLES	Gender budgeting
BJP alliance	**2.872*****
	(0.879)
INC alliance	-0.544
	(0.609)
Left alliance	**-1.642***
	(0.970)
Governance Performance Index (GPI)	-2.690
	(4.694)
Literacy rate	-0.037
	(0.074)
Crime rate	0.125
	(0.083)
Population: female to male ratio	7.345
	(6.862)
Population density (km^2)	-690.797
	(1,271.304)
Population (millions)	0.020
	(0.014)
Coastal indicator	1.556
	(1.242)
Constant	-8.094
	(6.336)
Observations	112
Pseudo R^2	0.59
Number of States	14
Year FE	YES

Sources: Authors' estimates based on data from CEIC India Premium Database, Mundle et al. (2016), Vaishnav and Swanson (2015), and Ministry of Women and Child Development (2015).

Notes: Robust standard errors in parenthesis. Year dummies are not reported but are available upon request.

***, **, * indicate significance at 1%, 5%, and 10% respectively.