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The Burden of Government Debt in the Indian States

Implications for the MDG Poverty Target

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Abstract

In this paper we explore what impact, if any, government debts have on achieving the Millennium Development Goals for the Indian states. To fulfill the goals, national governments, especially in the developing world, have to undertake major investments in the social sector; but how much they will really be able to do so will depend on the conditions of their finances. For the Indian states we find that government investment in the social sector is extremely important to reduce poverty, but the government's debt burden is actually stopping several states from attaining the MDG targets. Although, in the medium term the impact of the debt on poverty is not very harmful, in the longer run it has a significant negative impact. Therefore for policy purposes reduction in debt should be given a priority.

Keywords: debt, Millennium Development Goals, poverty

JEL classification: I32, O10, O23

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Acknowledgements

1   Introduction

The purpose of this paper is to explore what impact, if any, government debts have on achieving the poverty target of the Millennium Development Goals (MDGs) for the Indian states. The MDGs specify the target levels to be achieved for a set of specific indicators by 2015. By addressing a broad range of indicators such as income poverty, health, literacy, gender, environment, with strong interlinkages between them, the UN general assembly which ratified the MDGs, hoped to bring about a reduction in the overall level of deprivation in the world (UN 2000). The goals are ambitious. Among others it calls for halving of poverty, illiteracy, and infant mortality by 2015.[1] This, however, also means that to fulfill the goals, national governments, especially in the developing world, have to undertake major investments in the social sector. But how much they will really be able to do, will depend on the conditions of their finances, which therefore, indirectly determine the success of the MDGs.

Taking government debt as one of the indicators of their financial condition, in this paper we look into the ability of governments for increased and sustained expenditure in the social sectors. Typically one would presume that large government debts are incurred in subsidizing health or education programmes or direct poverty eradication programmes. Therefore, an increased government debt would reflect an increased involvement of the government in such programmes. Thus higher debt will alleviate poverty. This, however, is not at all obvious. If interest payments on debts are high, a country may easily slip in to a debt trap, where it is incurring larger debts just to be able to pay its previous debts. Higher debt may persuade governments to reduce some of their social programmes which may have directly benefitted the poor. In such circumstances debt will increase poverty. In

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[1]The base year for the MDG's are 1990. Therefore poverty in 2015 should ideally be half that of 1990.

this paper we explore this issue of how debt effects poverty in greater detail.

Given the large concentration of poor and deprived in South Asia, the performance of this region becomes crucial to the achievements of the MDGs (World Bank 2006). In India, which is the largest country in the region, due to the federal nature of the political system, the constitution separates the responsibilities of the centre and the states. The centre and the states each have a list of areas which are under their direct control and there is also a concurrent list for which both the centre and the states are responsible.[2] Most of the MDGs fall under the concurrent list or the state list. Hence, for our study we have focussed on the Indian states. Moreover, given the differences between the states in India, both in terms of economic growth and quality of life indicators, such state level analysis provides a more realistic base to study the progress towards the MDGs.

In studying poverty in India, therefore, it is important to assess the state governments' role and capabilities. For the Indian states, in a series of papers Besley and Burgess (2000), Besley and Burgess (2004), Burgess and Pande (2005) have discussed how institutional environments, business climate and access to finance impact poverty, however, the role of government finances in poverty reduction has not been studied so far. In this paper we will assess both the direction and the magnitude of the effects of debt on poverty and place it in the context of having sustainable poverty reduction in the long run and thus achieving the MDG with respect to poverty. For instance, according to news reports (The Telegraph, 19 November, 2004) in Orissa, which is one of the poorer states, 'the government debt was 63 per cent of the state's gross production and 329 percent of its total revenue in 2003-04. Salary bills, pension and interest payments on loans are a whopping 77 per cent of the state's annual expenditure'. This is not just the

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[2]The Seventh Schedule of the Constitution of India contains the lists of activities that come under the center or the state. For more details refer to the Government of India website: http://indiacode.nic.in/coiweb/welcome.html

case for the poorer states; many other states in India face similar situations. West Bengal, relatively a medium level state in terms of its achievements, spends around 46 per cent of its total receipts including tax, non-tax and loan receipts, to service debts. Its expenditure on salary, pensions and loan repayments is more than 100 per cent of its total revenue.[3] Obviously, this does not leave much room for development related expenditures. In a more rigorous study of the public sector debts in India, Kochar (2004) notes that 'India has among the most largest and most intractable fiscal imbalances in the world'. Rangarajan and Srivastava (2003) recommend a reduction in the level of the primary deficits so that over all the debt can be sustainable. In fact taking account of hidden subsidies and future commitments by the various state governments, the debt burden takes on a serious magnitude notwithstanding the assets of the governments. In their study comparing Indian government finances with other emerging markets, Roubini and Hemming (2004) finds that India faces a higher risk of a debt crisis due to its huge debt burden. Recognizing the gravity of the issue and its potential to create severe macroeconomic imbalances, the Twelfth Finance Commission of India has recommended a radical restructuring of the state level debts to reduce the overall debt burden (Bagchi 2005; Kurian 2005).

Although there are several dimensions of the MDGs, we have chosen to study income poverty in particular. Apart from its importance within the MDGs, it is also one of the most studied indicators for the Indian states. Further, detailed data on poverty for each state has been collected for all states in India for several years. However, we should point out that the methodology used in this paper can be equally applied to study the impact of government debt on any other MDG indicators. The plan of our paper is as follows. In the next section we discuss the data and the methodology that we will use. Section 3 is about the results and the analysis. Section 4,

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[3]Bengal on the Verge of Debt trap. The Telegraph, 8 February, 2005.

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discusses some simulation results and the final section highlights the main implications of the results.

2   Debt and MDGs

The literature describing how debt and the MDGs are related, is limited. Not all of the MDGs will be affected by the government's fiscal policy. For instance, government debt may not have any bearing on the goal of achieving gender equality in both primary and secondary education, but it will certainly affect the goal of halving poverty and hunger, achieving universal education and reducing child mortality by two thirds. Any goal that may require a government to pour in resources will be affected by the conditions of the government's finances. Given our interest on the goal of halving poverty, we look at how debt affects economic growth since economic growth plays an important role in poverty reduction.

There are several channels through which debt can impact economic growth. First, higher debt increases the possibility of higher taxes in the future, which in turn dampens long term investments. Investors may divert resources to short term investment and may hold back on any current investment. This can lead to a case of reduced efficiency along with a lower level of investment (Bräuninger, 2002). All these may cause 'debt overhang' where the states ability to honour its future debt commitments may be lower than its actual debt. In turn, this may create an environment of economic uncertainty and the possibility of capital flight increases substantially, leading to a decrease in growth and hence in poverty alleviation. The empirical evidence on debt overhang, however, remains inconclusive.[4]

On the other hand, under a Keynesian approach, debt can have a positive impact on growth by generating demand and creating employment. This is

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[4]See the discussions in Clements et al. (2003) on how debt can effect growth. Although they mainly focussed on external debt, the analysis will also be valid for total debt that includes both domestic and external debt.

particularly apt for developed countries under depression. How much this theory is applicable to developing countries, where the problem is not just the lack of demand, is arguable. Although the causal direction between debt and economic growth may be difficult to establish, economic theory also predicts that higher public debt lowers savings and thus increases interest rates. The increased interest rates then reduce growth through a reduction in investments. Kochar (2004) shows that public debt in India has been financed through private savings. This has allowed India to avoid significant external imbalances and inflationary pressures but has forced the government to offer an interest rate much higher than the market, thus making the public debt even more unsustainable. A higher debt also leads to reduction in the availability of credit for private investments and given that private investments are more efficient, this reduces the overall level of growth (Easterly 2004).

When it comes to debt and poverty, apart from the indirect impact of debt on poverty through economic growth, there is also the direct effect when governments with high debt curtail their social expenditures. For instance, IMF (2000) shows that for many of the highly indebted poor countries, a reduction in their debts has led to an increase in social expenditure that in addition to health and education includes spending on basic sanitary infrastructure, water supply and rural development. The direct impact of debt on social expenditure crucially affects the MDGs since most of the goals implicitly rely on government investments. For instance, to ensure universal primary education, the government needs to expand schools, hire more teachers and provide teaching tools; all these require substantial investment in education. Similarly, to reduce child mortality and achieve improvement in maternal health, governments in developing countries have to undertake more investment in the health care sector. If higher debt reduces such investments, clearly then, it affects the achievements of the goals. In India

with increased debt, the social expenditure decreased from 6.7 per cent in 1990-91 to 5.2 per cent in 2004-05 (Ghosh 2005). Typically, many of the government social expenditures are availed by the poor who lose out most when expenditures are curtailed. Reduction in government involvement in these areas may prompt more private sector investment but the poor may be priced out of availing from such services.

Further, as Kochar (2004) argues, the increased public debt in India has led to a change in the composition of revenue expenditures. A higher proportion of government revenue is going towards financing the debt. Governments investment in infrastructure has reduced and in turn has led to a slow down in economic growth. Lahiri (2003) shows that the level of debt in India is high compared to international standards and discusses the reasons behind the persistence of debt and how it impedes fiscal reforms. Kochar (2004) goes on to summarize that such increased levels of public debt has lead to a reduction in growth potential 'through deterioration in the quality of public expenditure, limitations on the room for macroeconomic policy maneuver and on the scope for further structural reforms and liberalization'.

3   Methodology

Our aim here is to understand whether debt does help or hinder the achievement of the MDGs poverty target. We proceed in two steps. First we empirically estimate the impact of government debt on poverty. The estimated equation may also involve other variables which matter for poverty reduction, such as GDP or health expenditure. Then we derive the trend values of those variables along with debt, for 2007 and 2015. Using the estimated equation, and the derived trend values, we predict the levels of poverty for different states for 2007 and 2015.

For the first step, since we have a panel data set, we run both the fixed effects and the random effects regressions. The fixed effect regression that

we estimate is

$$\ln p_{it} = \alpha_i + d_t + \beta \ln X_{it} + u_{it} \tag{1}$$

where α_i captures the state specific effects, p_{it} is the poverty head count ratio for state i in year t, X_{it} is a vector of explanatory variables such as government debt, per capita health expenditure, per capita income and per capita electricity consumption. d_t is a year dummy which takes into account year specific effects. u_{it} is the error term. Similarly the random effects regression is as follows

$$\ln p_{it} = \alpha + d_t + \beta \ln X_{it} + \varepsilon_i + u_{it} \tag{2}$$

where $\varepsilon_i \backsim N(0, \sigma_\varepsilon^2)$ represents the state specific random effects.

In this paper our interest lies in estimating the impact of debt on poverty reduction. Even if one finds a positive association between debt and poverty (that is, higher debt increases poverty) it still does not reflect causality from debt to poverty since an increased poverty may have lead to an increased debt. Additionally, this may raise an issue of endogeneity, since it is possible that debt itself may be effected by the poverty. It is important here to distinguish between fiscal deficit and debt. Although higher poverty in the current period may increase the deficit through more government expenditure to combat poverty, this increased deficit will lead to an increased government debt only in the future. Therefore, the current period poverty and current period debt are not directly related and hence issues of endogeneity does not arise. However, in modelling the causal direction from debt to poverty, we have used evidence from the literature (Kochar, 2004).

The next step is to use the estimated equation to derive the impact of debt on poverty. We use the following equation,

$$\ln \widehat{p}_{iT} = \alpha_i^* + \beta^* \ln \widehat{X}_{iT},$$

where $\widehat{p}_{iT}$ is the predicted level of poverty in time T, α_i^* β^* are estimated coefficients (derived from equations (1) or (2)), and $\widehat{X}_{iT}$ represents the trend levels of the explanatory variables at T. For our purposes we consider $T = 2007$ and $T = 2015$.

3.1 Data

The main data that we use to estimate equations (1) and (2) is for 25 states in India for 1993 and 1999.[5] We describe the data below.

For poverty we have the head count ratio for each of the 32 states and union territories in India from 1973-74 to 1999-2000, for, on average, every five years. These are based on the National Sample Surveys; our particular data comes from the Economic Survey of Delhi 2001-02. For 1999-2000 the data was collected using both a 30-day recall period and a 7-day recall period. We have used the 30 day recall period for our case, because it is closer to most of the adjusted estimates that various studies have pointed out.[6] For calculating the trend of poverty for different states we have considered the whole data set from 1973 onwards, but for estimating equations (1) and (2) we have used only the data for 1993-94 and 1999-2000. The main reason for doing so is the limited data we have with regards to government debt, health expenditure and other variables of interest.

As an indicator of government debts, we consider the ratio of debt to gross state domestic product (GSDP) in each state. Simply considering the level of debt is not sufficient, since it does not give an indication of the paying capability of the government. By taking the ratio of debt to GSDP, we get a fair idea of the burden of the debt on the government. We have this information from the report of the Twelfth Finance Commission for each state from 1993-94 to 2002-03 for every year. The debt includes internal debts, loans, advances from the central government, provident funds and

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[5] All the data used in this paper are available from www.indiastat.com

[6] For a discussion of the issues in this context refer to Popli et al. (2005).

insurance funds. Since our intention here is to investigate how government debt affects poverty reduction, we also need to control for government expenditure in the social sector. We take government expenditure on health as a close indicator of the government's expenditure in the social sector. For 25 states we have data from 1950-51 to 2001-02, on per capita state government expenditure on health, on average, for every five years. Not all states have information on all years.

Based on previous studies (Datt and Ravallion 1998) we also take into account other variables of interest which may help explain poverty, such as per capita real GSDP and per capita electricity consumption. While per capita GSDP has a direct impact on poverty, variables such as electricity consumption reflect the level of infrastructural facilities in the state. For the 25 states we have data on per capita GSDP for 1993-94 and 1999-2000. For one state, Mizoram, real per capita GSDP or net domestic product for 1999-2000 is unavailable. For per capita electricity consumption we have data for different states for 1990-91, 1994-95 and 1999-2000. Since we are interested in the year 1993-94, using data from1990-91 and 1994-95, we derive the values for 1993-94 through linear interpolation. Another variable of interest is literacy. Datt and Ravallion (1998) show that literacy plays an important role in explaining why some states have been more successful at reducing poverty. From the Department of Education, Government of India, we have data for 1991, 1997 and 2001. We derive the literacy rates for 1993-94 and 1999-2000 through linear interpolation.

4 Results and Analysis

In order to estimate the factors that effect poverty, we consider several possible models each with different control variables. The results here are based on a panel data for 25 Indian states for 1993-94 and 1999-2000. Table 1 shows the results which are estimated using a random effects model. We

also calculate the Breusch-Pagan test to check for the validity of the models. We will consider the fixed effect estimation later.

[Insert Table 1.]

The first column in Table 1 shows the regression of the log of the head count ratio on the log of debt ratio. The negative and significant time dummy implies that there is a decreasing trend in poverty, i.e. over time poverty is decreasing in the Indian states. Also, the coefficient of the log of the debt ratio is significant and positive, which implies that increased debt will increase poverty. This result is not very obvious. Higher debt can also mean lower poverty through higher employment from increased government expenditure. However, clearly the poor are not benefitting from any increased government debt. One explanation for such an occurrence may be that for many of the states, expenditure on salaries, pensions and loan payments is already close to 100 per cent of revenue. Further increase in debt is resulting from expenditure that is not necessarily targeted at the poor. This trend decrease in poverty holds true for all the models in Table 1. Compared to other single explanatory variable models, such as Models 2 and 3, Model 1 has a higher R^2. The Breusch-Pagan test confirms that the random error model may be appropriate in this case.

The second column in Table 1 shows the regression of the log of the head count ratio on the log of per capita health expenditure. The coefficient of the log of the per capita health is highly significant and negative indicating that as health expenditure is increased poverty will be reduced. It provides an argument for continuing and increased government investment in the social sector. The Breusch-Pagan test show that the random effect model is appropriate. In column 3, we run the same regression but with per capita real GSDP as the control variable. The coefficient is negative and significant. In fact, if the regression is run without the time dummy, the

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elasticity is close to one. Note also that the reduction in poverty through income growth is almost twice that from increased government expenditure in the social sector.

The next column controls for both log of health expenditure and log of the debt ratio. The coefficient of both the log of the debt ratio and the log of the health expenditure is significant. However, the coefficient of log of health expenditure is negative and the coefficient of the log of the debt ratio is positive. This implies that after controlling for social expenditure, as the debt burden increases, poverty also goes up. But an interesting difference between Model 1 and Model 4 is that the elasticity of debt ratio on poverty is higher in Model 1, which implies that once the level of health expenditure is controlled, increase in debt just increases poverty at a higher rate.

Column 5 takes into account per capita GSDP in addition to log of health expenditure and log of the debt ratio. The coefficient of both the log of the debt ratio and the log of the health expenditure is significant with a positive and negative sign respectively. But unlike other studies we find that coefficient of the per capita GSDP, though positive, is insignificant. It shows that at least for the Indian states, after controlling for health expenditure, increase in income does not make a significant dent on poverty. This brings to the fore the role of government expenditure in tackling poverty.

Column 6 which controls for log of per capita electricity consumption along with log of per capita health expenditure and log of the debt ratio, shows that the elasticity of both electricity consumption and health expenditure are significant and negative whereas debt is insignificant. If we consider per capita electricity consumption to be proxy for mechanization and therefore higher productivity, then with a greater increase in electricity we should see a reduction in poverty. It may be that government debt is resulting from spending in infrastructure and once we take that into account, the impact of debt becomes insignificant. However, note that in this case

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the Breusch-Pagan test rejects the random effects model at 5 per cent level of significance.

Table 2 shows the fixed effect estimation for the same regressions as in Table 1.

<center>[Insert Table 2.]</center>

It is clear from Table 2 that most of the results are similar to the random effects model in Table 1. In the fixed effects case, health expenditure reduces poverty, higher debt increases poverty. Also, we see (Model 11) that log of per capita GSDP is insignificant when we control for both log of the debt ratio and log of per capita health expenditure. There are, however, several notable differences between Tables 2 and 1. Interestingly in Model 9, in contrast to the random effect models, the per capita GSDP is positive but insignificant, indicating that GSDP per capita may have a limited role in reducing poverty. Another difference lies in the higher debt elasticity of poverty under the fixed effect than the random effect model. Within the fixed effect models, the debt elasticity of poverty is more than twice that of other variables such as GDP per capita or health expenditure. Further, the debt elasticity of poverty is greater than one, which shows that an increase in debt more than increases poverty. Clearly, debt is not being incurred to undertake programmes to combat poverty; instead it is being used in a manner that exacerbate poverty. Hence, debt will be a dominating factor effecting poverty. Interestingly for the fixed effect models, the time trend is not always significant, which shows that once we take the state specific effects into account, the time effects may not be that important. Thus inter state differences matter more than differences over time. Further there is also a difference between the two tables between Model 6 and Model 12. For the random effects model, log of debt ratio became insignificant when we controlled for log of per capita electricity consumption, whereas in the fixed effects case it is the opposite. While log of debt ratio is significant

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here, the log of per capita electricity consumption becomes insignificant.

Although we have not reported the results here, unlike other studies, we have found that literacy does not have a significant impact on poverty, especially in the presence of log per capita health expenditure.

4.1 MDG: 2007 and 2015

We choose the random effects estimation of Model 1, Model 2 and Model 4, to deduce the impact of debt on achieving the MDG with respect to poverty. Model 4 is chosen because it is the most parsimonious model with a good fit. Models 1 and 2 on the other hand will give us good comparative scenarios, by showing the effects of debt and health expenditure respectively, on poverty. Broadly, we can then discuss two cases: one, the impact of government investment in the social sector on poverty and two, the impact on poverty as such when we take into account government debt. Model 1 will be useful to compare the effect of debt on poverty, when we do not control for social expenditures.

Tables 3 and 4 gives the details of the predicted poverty for 2007 and 2015 for a smaller set of 16 states. These 16 major states comprise of 95 per cent of India's population. Note, however, our estimated equation is based on a larger number of states. First we discuss Table 3.

[Insert Table 3.]

The first column reports the level of poverty in 1990; the level of poverty which is the base year for the MDG's. Using a linear trend the next column reports the level of poverty that has to be attained by 2007 to be in line with achieving the MDG with respect to poverty by 2015.[7] In the third

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[7]The 2007 target is calculated using a linear trend on the poverty data from 1973 to 1990. We also take in to account the poverty in 2000 in estimating the MDG target for 2007.

column, using the poverty data from 1973-74 to 1999-2000 and fitting a linear trend, we derive the trend values of the head count ratios for the 16 states in 2007. The fourth, fifth and the sixth columns shows the predicted values of poverty in 2007 using Model 1, Model 2 and Model 4 respectively. The values for the log of health expenditure and log of the debt ratio are the trend values of those variables for 2007.

There are several features that stand out. The first is that the un-weighted average for the 2007 MDG poverty target is around 20 per cent and judging by the trend poverty level India on average will not be able to meet the goal. On the other hand when we take the predictions from the estimated models, we find that India is on track for satisfying the MDG poverty target. In fact according to Model 1, which tracks the effect of debt, India will be well within the MDG target for 2007 thus indicating that in the medium term state government debt may not have much of a negative consequence on poverty. Further, if we just take into account the impact of government investment in the social sector (Model 2), most of the major states in India will be in line with the 2007 MDG, although average poverty now is higher than under the case when debt is only taken in to account. It is important to note, comparing Model 1 and 2, that the health expenditure elasticity of poverty is less than that of debt. In other words, there will be a sharper decline in poverty from a same percentage decline in debt than increase in health expenditure. However, there are variations within states. States such as Himachal Pradesh, Punjab and Haryana fail to meet the targets under both Model 1 and Model 2. Surprisingly a large part of the reduction in poverty is coming from poorer states like Assam and Orissa.

But when the government debt and health expenditure both are taken into account (Model 4) the number of states that will not be able to meet the 2007 MDG doubles. States such as Bihar, Gujarat and Rajasthan which

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by Models 1 and 2 were within the MDG target, are now way above it. If we just considered the health expenditure, Gujarat would have reduced its poverty from around 25 per cent in 1990 to 12 per cent by 2007: below it's 2007 MDG target of 13.3 per cent. But when we take the debt into account, Gujarat's poverty increases to 15 per cent. In the case of Bihar the jump in poverty is the largest, from 17 per cent when just health expenditure is considered to 35 per cent when debt is taken into account. What is interesting here is that on their own, both debt and health expenditure seems to be able to reduce poverty significantly. But when we look at the effect of debt while controlling for the level of health expenditure, poverty increases dramatically. This applies to both Orissa and West Bengal too, though their increase in poverty is not high enough to overshoot their MDG target for 2007.

One of the surprises in our empirics is the failure of Punjab and Gujarat, which are generally deemed to be the richer states, to meet the MDG targets. In a broader sense one may question why some of the 'better' states such as Gujarat, Punjab are not able to meet their MDG targets whereas the poorer states such as Assam, and Orissa are able to do so. The answer to some extent lies in our modelling structure. Since we are using log linear models, it implies that states with already low levels of poverty will need to put in more in terms of their investing in health and lowering of debt to reduce poverty than states with high levels of poverty. Hence we see a dramatic decline in poverty for the poorer states. However, this also means that over time as the level of poverty comes down it will become difficult to achieve further reductions in poverty.

This is highlighted in Table 4, which provides the same information as in Table 3 but for 2015.

[Insert Table 4.]

Considering Model 4 (column 6) eight out of the sixteen Indian states will

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clearly not be able to meet the MDGs, although on an average India will meet the MDG targets. While in 2007 the predicted poverty was lower than the targeted poverty by three percentage point, by 2015, the difference reduces, to less than one and half percentage points. Interestingly, the average poverty predicted by just the debt ratio (Model 1) is greater than that predicted by just taking health expenditure (Model 2). Since the health expenditure elasticity of poverty is lower than that of debt and despite that we see that poverty is lower under health, it implies that the by 2015 the trend decrease in debt ratio is lower than the trend increase in health expenditure. In other words, failure to reduce government debt is impeding the reduction of poverty, although for all the three models the predicted poverty (Model 2 in column 5) will be within the MDG targets by 2015. However, the experience between the states is not uniform. As expected, states such as Maharastra and Karnataka are showing the greatest decrease in poverty. On the other hand, in addition to states such as Bihar, Gujarat, Himachal Pradesh, Haryana and Punjab, which fail to meet the MDG targets for 2015, two more states, Orissa and West Bengal joins this group. For West Bengal, poverty will increase in 2015 to 23 per cent from 21 per cent in 2007. The poverty in Orissa barely budges between 2007 and 2015. This is because, although from the trend levels of health expenditure poverty should decline, this is being countered by the increase in government debts.

The average poverty predictions from our models differ form the trend average poverty rates for both 2007 and 2015. In particular while all our models predict that India would satisfy the MDG target for both years the trend predictions imply the opposite. We find for states with low levels of poverty to begin with in 1990, such as Himachal Pradesh and Punjab, while the trend predictions for 2015 indicate that these states will meet the MDG targets, our predictions show that they will not do so. Punjab, with both high trend levels of debt ratio and low trend levels of health expenditure,

thus may end up with a higher poverty in 2015 than in 2000. There are also states like Assam and Madhya Pradesh where the trend predictions from column 3 show that they will not be able to meet their MDGs for poverty but in our calculations they will be able to fulfill the targets. It is interesting to note that since the trend poverty rates are predicted using a linear model, the differences between the MDG targets and the poverty targets carry through for both 2007 and 2015.

5 Simulation

Our predicted levels of poverty depended on the forecasted levels of debt and health expenditure. The forecasts were done by fitting a linear trend on a longer time series of these variables. However, it is quite probable that the forecasts will not match with the realized values, especially when the forecast period gets longer. Therefore in this section we discuss the predicted levels of poverty for 2015 based on Model 4, under different scenarios of debt and health expenditure. In particular we consider four cases each for debt ratio and health expenditure levels. In Table 5 we consider the cases where the debt ratio increases (and decreases) by 10 per cent and 25 per cent from the trend values, with the health expenditure remaining unchanged at the trend levels.

[Insert Table 5.]

As is obvious, an increase in debt ratio will take the Indian states further away from achieving the MDG poverty targets. Note that in 2015, given the trend levels of debt ratio and health expenditure, the Indian states on average will only just be able to reduce poverty by half. Hence, increasing the debt ratio will make that task even harder. But more interestingly a reduction of the debt ratio by 10 per cent from the trend values still does not reduce poverty to within the MDG target for the states which fail to meet

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the 2015 target. On the other hand with a 25 per cent decrease in the debt ratio, on average these states will come close to achieving the MDG targets although the goal remains unattainable for Bihar, Haryana and Rajasthan. Therefore, a significant reduction in debt will help more states realise the MDG goals.

Next we perform the same exercise for health expenditure levels. Using Model 4, we predict the level of poverty in 2015, when health expenditure is changed (increased and decreased) by 10 and 25 per cent. The results are reported in Table 6.

[Insert Table 6.]

As expected higher health expenditure reduces poverty. But even with a 25 percent increase in the health expenditure levels, 5 out of the sixteen Indian states fail to meet the goals. On the other hand a 25 per cent decrease in the health expenditure will stop ten states from fulfilling the MDG's, the highest in terms of the number of failed states under the different scenarios. However, less states will be able to meet the MDG target with a 25 per cent increase in health expenditure (as in Table 6) compared to the number of states that fulfill the goals when the debt ratio is decreased by 25 per cent (Table 5). The differences in the numbers are not large, with Gujarat and West Bengal being the only state which is switching under the two conditions, i.e. it fulfills the goals under a 25 per cent decrease in debt ratio but not under a 25 per cent increase in health expenditure.

Further comparing Table 5 and Table 6, the impact of debt on achieving MDG is clear. A 10 percent fall in the debt ratio decreases poverty by more than that achieved by a 10 percent increase in health expenditure. A 25 percent decrease in debt ratio does more to lower poverty than an increase in health expenditure by a similar percentage. Although there are states which does not achieve the MDG targets under any of the scenarios that we discussed, there is a considerable variation in the number of states that

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satisfy the MDG target by 2015. Out of the sixteen states the number of states that achieve the target varies between thirteen and six. But still some broad patterns emerge. In general, all the southern states in India, Andhra Pradesh Karnataka, Kerala and Tamil Nadu will definitely achieve the MDG targets. On the flip side, the northern states such as Rajasthan Haryana and Bihar would consistently fail to satisfy the targets. Orissa and West Bengal are the two states where deterioration in the debt ratio over time makes it difficult for them to achieve the MDG target by 2015.

6   Conclusion

Our objective in this paper was to investigate whether government debts in India impact the ability to achieve the MDGs. The results show that debt is a hindrance to the achievement of the MDG poverty targets. We find strong evidence that government investment in the social sector is extremely important to reduce poverty, but government debt burden is actually stopping several states from attaining the MDGs. Increasing both debt and health expenditure by similar percentage points will lead to an increase in overall poverty, since debt's marginal impact on increasing poverty is more than health's impact on reducing poverty. Clearly then, a strategy of increasing debt to fund health and other social expenditures may not be a sensible policy from the point of view of reducing poverty. Also as we had observed in Table 5 and 6, a 25 percent decrease in debt ratio will help more states achieve the goal than in the case of 25 percent increase in health expenditure. Therefore for policy purposes reduction of debt should be of crucial importance.

We should point out that our model is based on a panel data of twenty five states over just two years. A richer data set may yield different results. We took health expenditures as the main indicator for social expenditures by the government but a more comprehensive measure may be a better

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predictor of poverty. Also our health expenditure data are nominal values and there has been a significant increase in nominal health expenditure in the recent years. This may be driving some of results where some states are able to substantially reduce their poverty. If real expenditure on health is considered, it is quite probable that predicted levels of poverty may be ever higher, since the increase in real expenditure on health is going to be lower than the increases in nominal expenditures on health. Further, for most part we find a remarkable consistency in the states that are able to achieve the goals and those that do not. What the reasons behind this remarkable consistency are, is an issue for future research.

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Table 1: Random Error models on log of the head count ratio

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Log debt ratio	0.472* (0.224)			0.810* (0.213)	0.731* (0.241)	0.314 (0.214)
Log per capita health expenditure		-0.349* (0.166)		-0.584* (0.147)	-0.500* (0.187)	-0.449* (0.133)
Log per capita GSDP			-0.647* (0.208)		-0.345 (0.244)	
Log per capita electricity consumption						-0.059* (0.014)
Time dummy	-0.094* (0.016)	-0.038* (0.017)	-0.057* (0.017)	-0.034* (0.014)	-0.029* (0.015)	0.269* (0.070)
Constant	1.980* (0.738)	5.119* (0.733)	9.269* (1.841)	3.533* (0.719)	6.474* (2.218)	4.547* (0.614)
Number of Observation	50	50	50	50	50	50
R^2	0.626	0.569	0.531	0.730	0.727	0.688
Wald test	2674.19*	3154.72*	4745.43*	2124.70*	2816.56*	2996.16*
P value Breusch Pagan	0.001	0.001	0.003	0.0004	0.001	0.056

Notes: The values in the parenthesis are the robust standard errors. * indicates significance at 5%.

Table 2: Fixed effect model on log of the head count ratio

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Log debt ratio	1.579* (0.475)			1.519* (0.510)	1.594* (0.474)	1.368* (0.609)
Log per capita health expenditure		-0.677* (0.323)		-0.584* (0.209)	-0.496* (0.206)	-0.510* (0.192)
Log per capita GSDP			-0.515 (0.571)		-0.622 (0.432)	
Log per capita electricity consumption						-0.021 (0.015)
Time dummy	-0.127* (0.021)	-0.001 (0.033)	-0.061* (0.024)	-0.055 (0.028)	-0.046 (0.024)	0.089 (0.533)
Constant	-1.652 (1.540)	6.618* (1.507)	8.095 (5.081)	1.214 (1.773)	6.088 (3.134)	1.367 (1.791)
Number of Observation	50	50	50	50	50	50
Adjusted R^2	0.823	0.737	0.705	0.846	0.848	0.848
F-test	21.96*	14.92*	12.84*	16.47*	13.57*	13.57*

Notes: The values in the parenthesis are the robust standard errors. * indicates significance at 5%.

Table 3: Predicted values of poverty in 2007

State	Poverty 1990	MDG target 2007	Poverty trend 2007	Predicted poverty 2007		
				Model 1	Model 2	Model 4
Andhra Pradesh	23.950	13.999	12.324	9.497	12.555	12.543
Assam	40.422	28.680	31.291	9.714	14.484	16.564
Bihar	52.546	34.981	42.394	12.847	17.289	35.983
Gujarat	25.093	13.359	12.473	10.719	12.142	14.599
Haryana	17.570	8.761	8.809	9.385	13.075	13.155
Himachal Pradesh	16.379	7.891	8.945	13.922	8.138	11.705
Karnataka	32.221	18.206	18.510	8.626	9.784	7.007
Kerala	26.390	12.942	10.704	10.349	10.949	11.562
Madhya Pradesh	44.658	30.383	31.929	10.211	14.199	17.452
Maharashtra	36.699	21.907	23.167	8.637	12.173	10.112
Orissa	54.427	37.846	41.723	14.761	13.392	29.784
Punjab	11.645	6.002	5.104	9.569	11.041	10.247
Rajasthan	26.828	14.409	15.030	12.272	12.685	19.811
Tamil Nadu	35.937	19.649	20.323	8.809	11.770	9.897
Uttar Pradesh	40.287	26.014	28.994	11.097	14.649	21.210
West Bengal	39.956	23.734	23.198	12.259	13.135	20.964
Unweighted Average	32.813	19.923	20.932	10.792	12.591	16.412

Notes: Model 1 includes only debt, Model 2 includes only health expenditure and Model 4 includes both debt and health expenditure.

Table 4: Predicted values of poverty in 2015

State	Poverty 1990	MDG target 2015	Poverty trend 2015	Predicted poverty 2015		
				Model 1	Model 2	Model 4
Andhra Pradesh	23.950	11.975	9.015	11.510	9.164	10.309
Assam	40.422	20.211	27.739	10.765	11.040	12.552
Bihar	52.546	26.273	38.320	16.064	13.138	33.377
Gujarat	25.093	12.547	8.976	14.652	8.946	14.985
Haryana	17.570	8.785	6.365	11.354	9.907	11.475
Himachal Pradesh	16.379	8.190	6.729	17.143	5.670	9.146
Karnataka	32.221	16.110	14.260	10.308	6.559	4.875
Kerala	26.390	13.195	7.001	12.155	7.978	8.978
Madhya Pradesh	44.658	22.329	27.266	13.287	10.539	16.668
Maharashtra	36.699	18.349	18.658	11.344	9.029	9.809
Orissa	54.427	27.213	36.818	19.864	9.839	29.623
Punjab	11.645	5.822	3.462	9.774	8.178	6.437
Rajasthan	26.828	13.414	11.443	16.257	9.495	19.786
Tamil Nadu	35.937	17.968	15.542	10.856	8.670	8.499
Uttar Pradesh	40.287	20.143	24.837	13.480	10.757	17.680
West Bengal	39.956	19.978	17.961	17.045	9.952	23.218
Unweighted Average	32.813	16.406	17.149	13.491	9.304	14.839

Notes: Model 1 includes only debt, Model 2 includes only health expenditure and Model 4 includes both debt and health expenditure.

Table 5: Simulated values of poverty in 2015, with varied levels of debt ratio

State	Poverty 1990	MDG target 2015	Predicted poverty in 2015			
			10% increase in debt ratio	25% increase in debt ratio	10% decrease in debt ratio	25% decrease in debt ratio
Andhra Pradesh	23.950	11.975	11.137	12.351	9.466	8.166
Assam	40.422	20.211	13.559	15.038	11.525	9.943
Bihar	52.546	26.273	36.056	39.989	30.647	26.440
Gujarat	25.093	12.547	16.187	17.953	13.759	11.870
Haryana	17.570	8.785	12.396	13.748	10.536	9.090
Himachal Pradesh	16.379	8.190	9.881	10.958	8.398	7.245
Karnataka	32.221	16.110	5.267	5.841	4.477	3.862
Kerala	26.390	13.195	9.698	10.756	8.243	7.112
Madhya Pradesh	44.658	22.329	18.006	19.970	15.305	13.204
Maharashtra	36.699	18.349	10.596	11.752	9.007	7.770
Orissa	54.427	27.213	32.000	35.491	27.200	23.466
Punjab	11.645	5.822	6.953	7.712	5.910	5.099
Rajasthan	26.828	13.414	21.374	23.706	18.168	15.674
Tamil Nadu	35.937	17.968	9.181	10.183	7.804	6.733
Uttar Pradesh	40.287	20.143	19.099	21.183	16.234	14.006
West Bengal	39.956	19.978	25.081	27.817	21.319	18.392
Unweighted Average	32.813	16.406	16.030	17.778	13.625	11.755

Notes: Model 4, which included both debt and health expenditure, is used to predict the poverty under the different scenarios.

Table 6: Simulated values of poverty in 2015, with varied levels of health expenditure per capita

State	Poverty 1990	MDG target 2015	Predicted poverty in 2015			
			10% increase in health expenditure	25% increase in health expenditure	10% decrease in health expenditure	25% decrease in health expenditure
Andhra Pradesh	23.950	11.975	9.751	9.050	10.963	12.195
Assam	40.422	20.211	11.872	11.018	13.348	14.848
Bihar	52.546	26.273	31.571	29.300	35.495	39.483
Gujarat	25.093	12.547	14.174	13.154	15.936	17.726
Haryana	17.570	8.785	10.854	10.073	12.203	13.574
Himachal Pradesh	16.379	8.190	8.651	8.029	9.727	10.820
Karnataka	32.221	16.110	4.612	4.280	5.185	5.767
Kerala	26.390	13.195	8.492	7.881	9.547	10.620
Madhya Pradesh	44.658	22.329	15.766	14.632	17.726	19.718
Maharashtra	36.699	18.349	9.278	8.611	10.432	11.604
Orissa	54.427	27.213	28.019	26.004	31.503	35.042
Punjab	11.645	5.822	6.088	5.650	6.845	7.614
Rajasthan	26.828	13.414	18.715	17.369	21.042	23.406
Tamil Nadu	35.937	17.968	8.039	7.461	9.039	10.054
Uttar Pradesh	40.287	20.143	16.723	15.520	18.802	20.915
West Bengal	39.956	19.978	21.961	20.381	24.691	27.465
Unweighted Average	32.813	16.406	14.035	13.026	15.780	17.553

Notes: Model 4, which included both debt and health expenditure, is used to predict the poverty under the different scenarios.