



Addressing endogeneity in state-business relations across Indian states

Massimiliano Calì, Overseas Development Institute

This note discusses how the India research has addressed endogeneity concerns. The construction of an index of the quality of state-business relations (SBRs), described in the fourth briefing, allows us to test for the effects of effective SBRs on per capita incomes growth across Indian states for the 1985-2006 period. We estimate the SBR effect by using the following generic form:

$$Y_{it} = \alpha + \beta_0 Y_{it-1} + \sum_k \beta_k X_{ikt} + \rho SBR_{it} + v_t + u_i + e_{it} \quad (1)$$

Where i designates the state, t designates time, Y is the logarithm of real gross domestic product (GDP) (state) per capita, SBR_{it} is the measure of SBRs and X_{ikt} is a vector of standard control variables. The error terms v_t and u_i capture the time-invariant and state-invariant components of the error term, and e_{it} is the white noise component of the error term. The presence of the lagged GDP term, Y_{it-1} , captures both path dependence in growth experiences and the conditional convergence hypothesis predicted by the neoclassical theory of economic growth.

This specification confronts us with two important endogeneity problems. First, the presence of the lagged dependent variable in equation (1) leads to inconsistent estimates because of the endogeneity of the latter term. A natural solution for the first-order dynamic panel data models is to use Generalised Method of Moments (GMM). However, this method is efficient only asymptotically, and is suitable for samples with large N and small T . In our case, we have a small N (15 states) with a relatively large T (22 years). Therefore, the GMM estimation may not be appropriate. Instead, we use the Least Squares Dummy Variable Corrected (LSDVC) estimator to tackle the endogeneity of the lagged dependent variable. This method, originally proposed by Kiviet (1995) and Bun and Kiviet (2003), has been developed precisely as a suitable dynamic panel data technique in the case of small samples, where GMM cannot be applied efficiently.

However, the LSDVC estimation is valid only in the presence of exogenous regressors. To the extent that the SBR measure may be endogenous to economic activity, the SBR coefficients would be biased and the LSDVC method would

be invalid. There may be two types of endogeneity here: one driven by an omitted variable and one by reverse causality. The former could occur, for instance, if a successful private sector drove both sustained economic growth and pro-business reforms (captured by an increasing SBR measure). Part of the eventual correlation between SBRs and growth would be driven by the omitted private sector variable. Similarly, an increased rate of economic growth may provide more space for the government to enact business-friendly reforms in an attempt to facilitate the future growth process. On the other hand, the same situation may act as an incentive to obtain concessions from businesses in favour of workers, as the former are already gaining from increased growth. We do not speculate here on which situation may be more likely in the Indian context. However, we do acknowledge that this may be an issue. This potential endogeneity calls for an instrumentation strategy for our main SBR variable.

In order to control for the potential endogeneity of the SBR variable, we proceed in two stages. We first regress the SBR variables on a set of instruments supposed to be exogenous in specification (1) affecting per capita GDP growth via the SBR measure only. This is run through the following specification:

$$SBR_{it} = b_0 + BK_{it} + \gamma_t + \eta_i + \varepsilon_{it} \quad (2)$$

where K is the matrix of instruments. Taking the fitted value \widehat{SBR}_{it} from (2), we can plug it into specification (3) and estimate it via the LSDVC method:

$$Y_{it} = \alpha + \beta_0^{LSDVC} Y_{it-1} + \sum_k \beta_k^{LSDVC} X_{ikt} + \rho^{LSDVC} \widehat{SBR}_{it} + v_t' + u_i' + e_{it}' \quad (3)$$

We propose two types of instruments to estimate equation (2) drawing from India's political history, one based on land reform legislation enacted by Indian states at different points in time and the other based on the nature of the political regime in a given state.

Land reform was implemented under the 1949 Indian Constitution, according to which states are granted the power to enact (and implement) land reforms. Each state parliament implemented the reform through autonomous acts, with

significant differences in the intensity with which states have enacted the various types of land reform legislation over time. Such differences are captured by Besley and Burgess (2000), who constructed a panel data-type land reform variable by cumulating land reform acts between 1957 and 1992 in the major Indian states. By using land reform legislation and not the actual implementation of land reforms as a proxy of the anti-business attitude of state governments in India, we avoid the possibility that land reform implementation may be correlated with growth and therefore, cannot be a valid instrument.¹

Land reform legislation in India was intensely political. We postulate that the political process underlying SBRs was the mirror image to that underlying land reform legislation. States that implemented land reform aggressively were likely to be concerned mainly with the rural sector and the rural poor, while being relatively insensitive to the needs of the industrialists. The reverse argument should apply as well. Therefore, we would expect the intensity of the land reform legislation to be inversely related to the quality of SBRs. The data we analyse confirm that this is very much the case. Moreover, using the cumulative land reform variable, Besley and Burgess showed that land reform had a significant impact on reducing poverty but did not affect the overall rate of growth of Indian states over time. This is the necessary exclusion restriction condition for using land reform legislation as a valid instrument for SBRs.

The second type of instrument is based on the results of the political elections at the state level. We exploit the fact that SBRs are the outcome of a political process, with different groupings in state legislatures (the Vidhan Sabha) having different propensity to engage with businesses. We use data from records of the number of seats won by different national parties at each of the state elections under four broad groupings in line with the classification of Besley and Burgess. We update their data to the most recent elections and express seats as a share of total seats in the legislature.² We lag these variables one year to decrease the potential concern about their endogeneity.

The results from the first stage estimation (2) confirm our priors. Land reform legislation (lagged two years) appears to be negatively and significantly associated with the SBR variable. The electoral results variables are also broadly in line with expectations, although they are not significant – which suggests that SBRs are not driven mainly by electoral results. The F-test strongly rejects the hypothesis that the instruments are jointly not significantly different from zero, reinforcing the belief that these variables are good predictors of SBRs. The fitted SBR value from this first stage estimation should be purged of the endogeneity of the actual SBR value and can be used for the second stage estimation. The results from the latter suggest that SBRs have a significant and positive impact on the growth of income per capita in the panel of the major Indian states we consider.

Endnotes:

1. Deininger et al. (2009) show that land reform implementation in India has had a positive effect on household incomes and accumulation of physical and human capital, although their effect on economic growth is unclear.

2. The parties contained in the relevant groups are given in parentheses after the name of the grouping. These are (i) Congress Party (Indian National Congress + Indian Congress Socialist + Indian National Congress Urs + Indian National Congress Organization), (ii) a hard left

grouping (Communist Party of India + Communist Party of India Marxist), (iii) a soft left grouping (Socialist Party + Praja Socialist Party) and (iv) Hindu parties (Bhartiya Janata Party + Bhartiya Jana Sangh).

References:

Besley, T. and Burgess, R. (2000) 'Land Reform, Poverty Reduction and Growth: Evidence from India.' *The Quarterly Journal of Economics* 117(4): 389-430.

Bun, M.J.G. and Kiviet, J.F. (2003) 'On the Diminishing Returns of Higher Order Terms in Asymptotic Expansions

of Bias.' *Economics Letters* 79(2): 145-152.

Deininger, Jin and Nagarajan (2009) 'Land Reforms, Poverty Reduction and Economic Growth: Evidence from India.' *The Journal of Development Studies* 45(4): 496-521.

Kiviet, J.F. (1995) 'On Bias, Inconsistency, and Efficiency of Various Estimators in Dynamic Panel Data Models.' *Journal of Econometrics* 68(1): 53-78.