State business relations and manufacturing productivity growth in India

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Empirical studies on total factor productivity growth (TFPG) in developing countries highlight trade open-ness, research and development and market structure as being the most important determinants of TFPG. The role of institutions remains overlooked in the literature on the determinants of TFPG. In this paper, we look into the role of institutional quality as captured by effective state-business relationships (SBRs) in influencing TFPG, using Indian manufacturing as a case-study. By SBRs we mean a set of highly institutionalised, responsive and public interactions between the state and the business sector. To compute TFPG, we use firm level data for both the formal and informal manufacturing sector. We correct for the simultaneity bias associated with the production function approach for TFPG estimation by employing a method developed by Levinsohn and Petrin. We propose measures of effective SBRs for 15 Indian States over the period 1994-2005, and then use them in TFP growth equations to estimate the effect of SBR on TFPG. The results indicate that SBR has positively affected the TFP growth of Indian industry. The effect however is primarily for the formal sector.

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I. Introduction

It has been shown that long-term growth and development across countries is driven to a large extent by productivity growth (Easterly and Levine, 2001).[1] Several studies exist that have attempted to examine the effect of different factors influencing productivity growth using industries or firms as units of analysis. Most of these studies highlight the role of trade open-ness, research and development and market structure as major determinants of industry or firm productivity growth (see for example, Harris, 1999, Bartelsman and Doms, 2000, Tybout, 2000, Chand and Sen, 2002, Goldar and Kumari, 2003, Isaksson, 2007, and Mitra and Ural, 2007). While trade, technology and market structure are important determinants of productivity growth, there has been less recognition in this literature of the importance of institutions (North, 1994). In this paper, we examine the role of a specific set of institutions – effective state business relations - in explaining productivity growth across industries. By effective state business relations (SBRs) we mean a set of highly institutionalized, responsive and public interactions between the state and the business sector. Case-studies of the East Asian experience suggest that collaborative relations between the state and the private sector was crucial in bringing about economic growth in that region (Amsden, 1992, Maxfield and Schneider, 1997, Harriss, 2006). While much of the literature on SBRs have looked at their effects on economic performance at the macro level (Sen and te Velde, 2009), our interest in this paper is to examine the micro-level impact of effective SBRs by testing for the effects of effective SBRs on total factor productivity growth (TFPG) using industries as units of analysis. Our empirical context is Indian manufacturing, and we examine whether the variation in TFPG across Indian states can be related to variations in effective SBRs across these states.

We first propose a measure of effective SBRs for the 15 major Indian states for the period 1994-2005. We then exploit the differences in institutional quality across Indian states (as measured by our SBR index) to examine the effects of the SBR measure on total factor productivity growth across industries and states and over time. India provides a rich empirical context to study the impact of effective state-business relations on manufacturing productivity for three reasons. Firstly, differences in regional industrial performance persist, in spite of the dismantling of the License Raj regime in 1991 and significant trade liberalization since the 1990s.[2] These policy reforms should have led to a convergence of industrial productivity growth across Indian States, but this has not happened. Secondly, India's federal structure and the significant political autonomy and independence in legislative powers enjoyed by state governments, along with regional variations in the collective

[1] According to a recent study by the Center for the Study of Living Standards (CSLS), in countries with the lowest GINI indices, a one per cent rise in labour productivity is associated with 1.02% decline in the incidence of poverty. However, for countries with the highest GINI indices, the impact is less than a half per cent (CSLS, 2003).

[2] In the cross-country context Harrigan (1999) has also observed a lack of convergence of TFP for the same industries across OECD countries.

strength of the economic and political elite allows for the variation in regional institutional quality that may allow us to identify its effects on TFPG. Finally, the availability of firm level data for the Indian manufacturing (encompassing both the formal and informal segments of the manufacturing sector) allows us to estimate TFPG at a very disaggregated level of analysis – corresponding to the ISIC 5 digit level – and thus, circumvent the problem of aggregation bias in productivity estimates that is a common feature of most empirical studies on productivity for developing countries. As has been increasingly realized in the modern literature on productivity, there is significant degree of heterogeneity in productivity across firms and industries, and the more disaggregated the estimates of productivity, the more accurate these estimates are likely to be (Melitz, 2003).

Our paper has two important methodological strengths. Firstly, we are able to test for the effects of effective SBR on TFPG for the combined manufacturing sector, which includes both the formal and informal segments of the manufacturing sector. Previous studies on TFPG in Indian manufacturing have estimated TFPG only for the formal manufacturing sector. This is a serious omission as nearly 35 per cent of output and 85 per cent of employment in Indian manufacturing are in the informal sector (Mukherjee, 2004). A second strength of the empirical analysis is that we use the Levinsohn-Petrin method of calculating total factor productivity growth, which addresses the simultaneity bias in standard productivity estimates.

The remaining paper is organized in six sections. Section II summarizes the theoretical and empirical literature on determinants of productivity growth, and discusses the role of effective state business relations in enhancing productivity. Section III describes the methodologies, both in estimating TFPG, and in testing for the effects of effective SBRs on TFPG. Section IV discusses how we can measure effective SBRs in the Indian context. This is followed by a description of the data and variables used in the empirical analysis in Section V. The section then provides the estimates of TFPG calculations. Section VI provides the results of the TFP growth estimations, where we test for the effects of effective SBR on TFPG. Section VII concludes.

II. What Determines Productivity Growth in Industry?

The literature has proposed various potential determinants of industry or firm productivity. These include trade and openness, ownership, role of institutions such as labour market, public investment in health, human capital, physical infrastructure leading to better quality of work force, research and development (R and D), and the business environment. As can be seen, the factors can be categorized into policy variables or institutions.[3]

[3] While institutions consist of rules – formal and informal - and norms within which individuals and firms function, policies refer to various measures a government adopts to achieve its goals and objectives within the country's institutional framework (Mitra and Ural, 2007). In many cases, the dividing line between policies and institutions is very blurred.

There are reasons to expect a favorable effect from trade or openness on industrial productivity. Trade leads to efficient production through gains from specialization and exchange (Mitra and Ural, 2007). Availability of larger variety of inputs can augment firms' productivity through greater division of labour and/or through better matching between output and inputs (Krugman and Obstfeld, 2005). The increased competitive pressure on industrial units in a liberalized trade regime force them to be more efficient in the use of resources (through better organization of production, or effective utilization of labour, or capacity), ultimately leading to higher productivity.

In addition, trade can affect R and D and hence productivity in two contrasting ways as argued by Devarajan and Rodrik (1991) and Rodrik (1992). A reduction in tariff reduces the market size of a domestic (import-competing) producer and therefore reduces the gain from a cost-reducing innovation (called as market size effect), whereas it enhances competition from foreign substitutes, thereby reducing the mark up (hence monopoly power) leading to increased output (the pro-competitive effect). The former has a negative impact on R and D and therefore on productivity, the latter represents a positive effect. Trade liberalization also induces firms to invest in R and D to increase efficiency, thereby enabling them to face the increased competition arising from international trade (Kathuria, 2008). Trade, as found by Melitz (2003), can also force least productive firms to go out of the market thereby reallocating resources to the surviving firms so as to increase overall productivity of the industry. Several studies show a beneficial effect of exports on firm TFP (see for instance, Kraay, 1999; Blalock and Gertler, 2004; Fernandes and Isgut, 2006). The evidence for developing countries, including Asian countries, however is mixed (see Das, 2002 for a review of these studies).

The productivity of various inputs in production clearly depends on the quality of public infrastructure. For instance, the quality of human capital unambiguously depends on the quality of education, health and social services – as provided by the government. Investment on infrastructure and social services is thus, another policy variable having positive impact on productivity (Mitra and Ural, 2007; Iskasson, 2007). Studies by Tan and Lopez-Acevedo (2002), Aw *et al*., (2005) among others have found positive influence of human capital and training on the firm's TFP.

Another policy variable that has an adverse affect on the efficiency of the firms is the prevailing competitive condition in the sector. Restrictions on free entry and exit of firms hinder competition faced by existing firms and thus lower firm efficiency. This also prevents inefficient firms from exiting the market. Thus, the productivity of the industry as a whole gets adversely affected by restrictive industrial policies. Free entry and exit of firms does not work in isolation, the precise impact depends on how it interacts with labour market institutions (Mitra and Ural, 2007). For example, easy entry and exit will not have a requisite effect if labour market restrictions on firing of workers are in place, since essentially this is an exit barrier. It is also an entry barrier since it discourages entry by discouraging firms from hiring permanent workers who would benefit from on-the-job training (*ibid*.).

Empirical evidence also exists for the positive impact of R and D activities on firm productivity (Griliches, 1998; Kathuria, 2008). Recent literature has also focused on the role of the business environment for firm TFP (Hallward-Driemeier, *et al*., 2003; Dollar, *et al*., 2005; Wagner, 2007) and the effects of foreign ownership on firm TFP (Arnold and Javorcik, 2009; Kee, 2005).

It can be clearly seen that some of the determinants discussed such as infrastructure and a favourable business environment are outcomes of good state-business relations (SBRs). Some indeed are determined nationally such as trade and competition policies. Others such as technological factors and R and D intensity may be determined at the industry level. However, nationally governed or industry-specific factors cannot explain why productivity growth for the same industry may differ across regions within the same country. Any differences in productivity growth for the same industry across regions in the same country can be related to the quality of institutions at the regional level. This is well illustrated in Table 1 and Fig. 1, which give the range of productivity and productivity growth for some of the key industries across Indian States.

Table 1: Productivity (in Rs.) variation across the States for the same industries for 3 years

Industry	Year = 1994	Year = 2000	Year = 2005
Pump, Compressors and Valves	0.76 – 33 256	0.32 – 46 948	0.15 – 38 212
Agriculture and Forestry Machinery	0.61 – 17 0326	0.39 – 43 3879	0.09 – 32 4703
Machine Tools	0.46 – 50 028	0.94 – 23 424	0.66 – 42 884
Food, Beverages and Tobacco Processing machinery	1.41 – 43 145	0.72 – 40 504	0.63 – 30 971
Domestic Appliances	0.50 – 31 502	1.23 – 24 931	0.31 – 38 935

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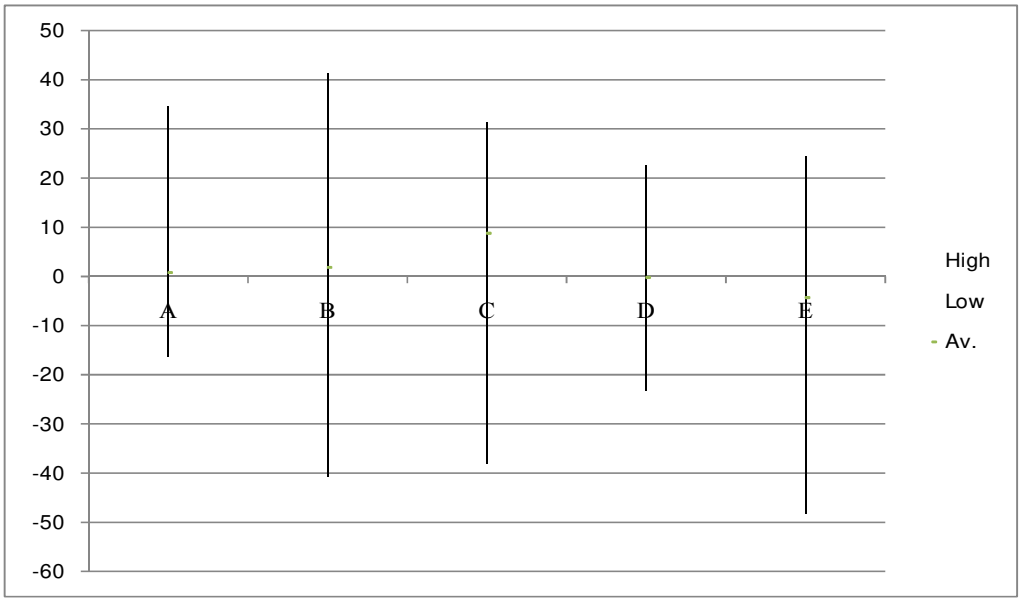

Notes: A – Pumps, compressors and valves; B – Agriculture and Forestry Machinery; C – Machine Tools; D – Food, Beverages and Tobacco Processing Machinery Industry; E – Domestic Appliances.

Fig. 1. Productivity (TFP) growth variation across states for the same industries

The table and figure indicate a wide variation in productivity and productivity growth across identical industries. This calls for an investigation of the role of institutional quality as captured by effective state-business relations in explaining the variation in TFPG for the same set of industries across States in India.

Why should effective SBRs lead to higher productivity growth?

Effective SBRs can have a positive impact on productivity growth by creating an institutional environment where the state provides high quality public goods that matter to the private sector such as infrastructure, effective public administration (or the lack of corruption) and secure property rights. Public investment in infrastructure is highly complementary to private investment in developing countries, and has strong 'crowding in' effects (Blejer and Khan, 1984). A well organized private sector can make clear to the state where the priorities are for public investment and can monitor the quality of such investment. Such high quality investments are more likely to be forthcoming with a well organized and responsive state. Effective public administration and lack of expropriation of property rights of the private sector is more likely to occur with professionally run and well organized government agencies and through the direct and indirect pressures that business associations can place on government officials.

Effective SBRs can also influence the productivity of investments by leading to better allocation of investment funds. Peak and sectoral business associations that are active, independent of the state and representative of the private sector in the region, can resolve many of the collective action problems that are inherent in developing countries, where most firms are of small and medium size and are unable to articulate their views and concerns to agencies of the state. Such business associations can provide accurate information on current and future investment opportunities and potential problems to its members, invest in training of the workers of member firms, help in enforcing industry quality standards and voice the demands of its members to industry ministries and state investment agencies (Cammett, 2007). By doing so, such associations can minimize transactions and coordination costs and ensure that investments that are made by its members have the highest returns. Synergistic state-business relations also minimize the possibility of rent-seeking and collusive behaviour which may lead to directly unproductive economic activities (Krueger, 1974; Bhagwati *et al.,* 1984). Thus, effective SBRs can be expected to increase the efficiency of investment and of overall productivity growth in the economy.

III. Methodology

Growth equation estimation

In this section, we discuss the empirical specification used to statistically establish the relationship between state-business relation (SBR) and TFPG. The following regression function is estimated separately for combined, formal and informal sectors.

$$TFPG_{ist}^{I,F,C} = a_0 + a_1 X_{it} + SBR_{st} + T + e_{ist} \quad (1)$$

The subscript i, s and t index the industry, state and time period. TFPG is total factor productivity growth, X is a vector that includes other determinants of TFPG such as trade and competition variables, SBR is the period-averaged measure for State s at time t (where t=1994-2001 and 2001-2006) and T is the time dummy, which is equal to 1 when t = 2001-2006 and 0, otherwise. e_{ist} is the state-industry-time error term. I, F, and C represent Informal, Formal and Combined sector respectively.

The trade and competition policy variables used as controls for the above growth equation estimation include the import-penetration and export orientation ratios, tariff rates and the Herfindahl-Hirschman index (HHI) at the 4 digit level. We however could not directly control for the R and D intensity, but used industry dummies in one of the specifications to see the effect of any industry-specific policies. We have included a year dummy, T, to capture macroeconomic shocks to capacity utilization, which may affect TFP over time.

We test the relationship separately for formal and informal manufacturing sector for two reasons: a) the duality in Indian manufacturing sector; and b) the way SBR variable has been conceptualized and constructed. The Indian manufacturing sector consists of two categories of firms depending on the size of the labour force in the firm – formal and informal sector. Firms which are in the formal sector are required to adhere to various regulatory norms besides providing several benefits to the workers.[4] Apart from this, the reservation of few products for small scale units and tax benefits to them has resulted in duality in Indian manufacturing (Mazumdar and Sarkar, 2008). Secondly, as we see later, the SBR essentially measures the effectiveness of formal organizations whether they are in the domain of the State or of the private sector. Testing the relationship for formal and informal manufacturing in a way would be test for this duality and validity of the scope of SBR.

TFPG estimation

For finding TFPG, we estimate the Cobb-Douglas production function in equation 2 separately for each of the 15 major Indian States.[5]

$$\ln Y_{ist} = A_{st} + \beta_L \ln L_{ist} + \beta_K \ln K_{ist} + u_i + v_{ist} \quad (2)$$

[4] The formal sector in India is defined to be the set of firms who are registered under the Factories Act (1948), and by doing so, fall under the purview of labour laws and other government regulations. Firms are required to register if they employ 10 workers if they use electricity, and 20 workers if they do not use electricity. The informal sector in India is considered to be the set of firms which employ less than 10 workers if using electricity and 20 workers if not using electricity. The formal and informal sectors in India are often referred to as the organized and the unorganized sectors.

[5] The States included are Andhra Pradesh (AP), Assam, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh (MP), Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu (TN), Uttar Pradesh (UP), and West Bengal (WB).

The subscript i, s and t index the industry, state, and time period. The variables Y, L and K represent the real value added, labour and capital inputs respectively. 'A' is TFP which represents the efficiency of the firm in transforming inputs into output.

The estimation of the coefficients of labour and capital using ordinary least squares (OLS) method implicitly assumes that the input choices are determined exogenously. Firm's input choices can be endogenous too. For instance, the number of workers hired by a firm and the quantity of materials purchased may depend on unobserved productivity shocks. These are overlooked by the researcher but they certainly represent the part of TFP known to the firm. Since input choices and productivity are correlated, OLS estimation of production functions will yield biased parameter estimates. To correct this endogeneity bias, we employ a methodology recently developed by Levinsohn and Petrin (2003).

Researchers in the past have used techniques like fixed effect estimation or the semi-parametric methodology developed by Olley and Pakes (1996) (henceforth OP) to correct this bias. The fixed effects estimation however eliminates only unobservable *fixed* firm characteristics that may affect simultaneously input choices and TFP; there may still be unobserved *time varying* firm characteristics affecting input choices and TFP. The main idea behind LP methodology is that an observable firm characteristic – intermediate inputs – can be used to proxy the unobserved firm productivity and estimate unbiased production function coefficients.

Levinsohn and Petrin (LP) methodology. Simultaneity arises because productivity is observed by the profit maximizing firms (but not by the econometrician) early enough to influence their input levels (Marschak and Andrews, 1944). This means that the firms will increase (decrease) their use of inputs in case of positive (negative) productivity shocks. OLS estimation of production functions thus yield biased parameter estimates because it does not account for the unobserved productivity shocks. OP method overcomes the simultaneity problem by using the firm's investment decision to proxy unobserved productivity shocks. The estimation rests on two assumptions. First, productivity – a state variable in the firm's dynamic problem – is assumed to follow a Markov process and is unaffected by the firm's control variables. Second, investment – one of the control variables of the firm – becomes part of the capital stock with a one period lag. In the OP method, labour is treated as a nondynamic input and capital is assumed to be a dynamic input. A firm's choice of labour has no impact on the future profits of the firm. The OP estimation involved two steps. The coefficients of the variable inputs and the joint effect of all state variables on output are estimated in the first step. In a two input framework, the former is just labour and the latter are capital and productivity. Investment is assumed to be a monotonically increasing function of productivity and inverting the investment equation nonparametrically provides an observable expression for productivity. This expression is used to substitute the unobserved productivity term of the production function, hence allowing identification of the variable input elasticities.

The coefficients of the observable state variables (capital if there are only two inputs) are identified in the second step by exploiting the orthogonality of the quasi-fixed capital stock and the current change in productivity. A nonparametric term is included in the production function to absorb the impact of productivity, to the extent it was known to the firm when it chose investment in the last period. The second term included in equation 4 below captures the unobserved productivity shock and uses the results of the first stage (i.e., equation 3).

The estimating equations for the two steps are

$$y_{ist} = \beta . l_{ist} + \gamma . k_{ist} + h_{is}(i_{ist}, k_{ist}) + e_{ist} \quad (3)$$

$$V_{ist} = \gamma . k_{ist} + g(\emptyset_{t-1} - \gamma . k_{t-1}) + \mu_{ist} + e_{ist} \quad (4)$$

The functions *h* and *g* are approximated nonparametrically by a fourth order polynomial or a kernel density. Once both the equations are estimated, we have estimates for all the parameters of interest. The labour coefficient is obtained in the first stage and capital coefficient in the second stage. These estimates are termed as OP estimates. A major advantage of this approach is the flexible characterization of productivity, only assuming that it evolves according to a Markov process. However, the method also has few drawbacks. OP method demands a strictly monotonous relationship between the proxy, which is investment, and output. This means that observations with zero investment have to be dropped from the dataset in order for the correction to be valid. Given that not every firm will have strictly positive investment every year, this may lead to a considerable drop in the number of observations in the dataset, an obvious efficiency loss. This is all the more important for firms in the informal sector, where for years together firms hardly invest in capital. Levinsohn and Petrin (2003) developed an estimation technique that is very much similar to the one developed by OP but use intermediate inputs (*m*) as a proxy rather than investment.[6] Typically, many datasets will contain significantly less zero-observations in materials than in investment. This is what has been used in the present study. In LP, the first stage involves estimating the following equation:

$$y_{ist} = \beta_0 + \beta_l l_{ist} + \emptyset_t(m_{ist}, k_{ist}) + \varepsilon_{ist} \quad (5)$$

where $\emptyset_t(m_{ist}, k_{ist}) = \beta_k k_{ist} + f_t^{-1}(m_{ist}, k_{ist})$ is a nonparametric function. The estimates of β_l and $\emptyset_t$ are obtained in the first stage.

The second stage of the LP estimation obtains the estimate of β_k. Here, like OP, LP assumes that productivity (ω) follows a first-order Markov process, and is given by

$$\omega_{ist} = E[\omega_{ist}|\omega_{ist-1}] + \epsilon_{ist} \quad (6)$$

[6] LP use electricity as a proxy in their study. We could not use electricity as majority of firms in the informal sector are working without power which would lead to dropping considerable number of firms from our sample.

This assumption states that capital does not respond immediately to ϵ_{ist}, which is the innovation in productivity over last period's expectation (i.e., the shock in productivity). It leads directly to the following moment condition:

$$E[\epsilon_{ist}|k_{ist}] = 0 \quad (7)$$

The equation 7 states that the unexpected part of the innovation in productivity in the current period is independent of this period's capital stock, which was determined by the previous period's investment. Using this moment condition, β_k can be estimated from the following expression:

$$\epsilon_{ist}(\beta_k) = \omega_{ist} - E[\omega_{ist}|\omega_{ist-1}] = (\tilde{\phi}_{ist} - \beta_k k_{ist}) - \hat{\varphi}(\beta_k) \quad (8)$$

This moment condition identifies the capital coefficient, β_k. The saliency of this technique lies in the assumption that the current period's capital stock is determined before the shock in the current period's productivity.

IV. Measuring SBR in India

A major problem associated with testing the impact of effective SBRs on the economy concerns the way to properly measure them. Te Velde (2006) was the pioneering study to develop measures of the effectiveness of SBRs with an application for sub-Saharan African countries. He argues that an SBR index should have four components, which reflect the main aspects of effective SBRs:

1) the way in which the private sector is organized vis-à-vis the public sector;
2) the way in which the public sector is organized vis-à-vis the private sector;
3) the practice and institutionalization of SBRs;
4) the avoidance of harmful collusive behaviour between the two sectors.

Calli, Mitra and Purhoit (2009) (henceforth CMP) construct a composite SBR measure based on the above four dimensions for sixteen Indian states using both primary and secondary data.[7] We describe below the manner CMP operationalise the measurement of SBR in India.

The role of the private sector in SBR (SBR Private)

The most relevant way in which the private sector can organize itself vis-à-vis the public sector is via an umbrella organization. One of the major roles of such an organization is arguably lobbying the State to produce legislations and regulations that may favour the businesses. As argued by Kohli (2006) and confirmed by the fieldwork in CMP this is clearly the case in India as well. CMP capture the role of the private sector by measuring the quality and effectiveness of the umbrella business

[7] One important characteristic of this measure that is relevant for the empirical analysis in the paper is that it varies both over time and space, as the measure has been computed for the 15 major Indian states for the period 1985-2006. Due to the availability of firm level data only from 1994-95, we use the SBR measure from 1994 onwards. The variations in the measure both in the time-series and cross-sectional dimensions allow us to estimate the effects of effective SBRs on economic growth more precisely than may have been possible using cross-sectional measures of regional institutional quality such as the World Bank's Doing Business indicators which are only available for a few years (World Bank, 2009).

association (representing all sectors) and two other business associations representing the major sectors in each state. For each of these associations they use the following variables for such measurement:

a) Whether the private sector is organized through an **umbrella organization** or not (a score of 1 is given in each year the association existed, 0 otherwise).

b) Whether the private sector association has a **website** or not: The variable takes a value of zero in any year in which the organization does not have a website and 1 otherwise. This is likely to proxy for the quality of the organizational structure as well as its outside visibility. Evidence from their fieldwork confirms that organizations appearing to be more structured and organized have had an active website in place for a longer time.

c) How frequently **the website is updated**: Again, this captures the efficiency of internal processes (which makes frequent updates possible) as well as the level of activity of the organization. The need for updating the website more frequently should increase with the intensity of the organization's activity.[8]

d) Whether the association owns its **office premises** (value of 1) or not (value 0). This variable proxies the level of the organization's resources as well as the extent to which the association is willing to invest in costly physical assets, with owned premises suggesting a more established business association.

The role of the public sector in SBR (SBR Public)

CMP measure the role of the public sector in SBR by two measures:

a) the presence of state owned or state participated **productive corporations**, which are investment promotion agencies active in most states, i.e. Financial, Infrastructure Development and Tourism Development Corporations. These represent important types of pro-business engagements with benefits for all sectors (with the exception of the tourism corporation, which is the only sectoral corporation with a presence in virtually all states). CMP exploit the different timing of establishment of these corporations across states by constructing a cumulative sub-index ranging in value between 0 and 1 which is the average of four dummy variables, one for each organization. At any point of time the dummy for an organization takes the value of 1 if it is in place and 0 otherwise.

b) CMP also assess the role of the public sector via the governments' signalling of their relative priorities through the allocation of public resources towards economic activities. They measure this by the share of state **expenditures on economic services** as a ratio of total

[8] This variable is coded as the number of times the website is updated in a month, thus a monthly update has the value of 1, a weekly update has the value of 4.5, a daily update is equal to 30, an annual update is equal to 1/12, etc.

government expenditures and by the share of **industry expenditures** in total expenditures on economic services. Industry expenditure is that part of expenditure on economic services which is most closely related to SBR promotion activities.[9]

The interaction between states and businesses (SBR Practice)

CMP measure the interaction between state governments and the business sector in two ways:

a) **Index of labour regulation:** Industrial relations in India fall under the joint jurisdiction of the central and state governments under the Indian constitution. Industrial relations are governed by the Trade Unions Act of 1926, which specifies the conditions that a trade union needs to satisfy in order to be recognized under the act and the Industrial Disputes Act (IDA) of 1947, which sets out the institutions for adjudication of disputes (Ahsan *et al*., 2008). The IDA has been extensively amended by state governments during the post-independence period. CMP use the index of labour regulation proposed by Besley and Burgess (2000), who code each state amendment as neutral (0), pro-worker (+1) and pro-employer (-1), and then cumulate the scores over time for the period 1947-1997. CMP update this index to 2006. As CMP argue, a closer degree of interaction between business and state governments would be reflected in more pro-employer labour market regulation.[10]

b) **Stamp Duty**: CMP take state-wise stamp duties as proxies for the attitude of the state governments towards business establishments and their expansion. These proxies are valid because a stamp duty is a tax on the value of a transaction, most commonly on the transfer of movable and immovable properties and instruments used in commercial and business transactions. Moreover, stamp duties are one of the major sources of revenues for state governments and one of the few tax rates which state governments have the power to levy, when most tax rates are set by the Central government.

Mechanisms to avoid collusive behaviour (SBR Collusive)

CMP use the following measures to capture the transparency of SBRs:

a) The gross output of firms belonging to **delicensed industries** as a proportion of total industrial GDP. The License Raj was a system of centralized controls regulating entry and production activity introduced by the Indian federal government in and which applied to all states in India. There were two waves of delicensing as part of economic reforms, the first in 1985, and the second in 1991. Delicensing introduced competition and reduced rent-seeking by corporations entrenched with public powers. As argued by Aghion et al., 2006, p. 5, 'Since

[9] This is corroborated by CMP fieldwork results which indicate that only industry departments engage with the business sector in a 'significant' manner, identifying its needs and facilitating its operations.

[10] A similar argument is made by Rodrik and Subramanian (2004, p.17) who suggest that the Besley-Burgess index is 'a measure of how pro-labour (and anti-business) the environment in different states was.'

the Licensing Committee reviewed applications on a sequential, first-come, first-served basis, and the five-year plans laid down targets or ceilings for industrial capacity, this provided an incentive for pre-emptive license applications. This system tended to favour the larger industrial houses (e.g. Birla, J.K. and Tata) which were better informed and organized and submitted multiple early applications as a means of foreclosing on plan capacity.' As the decision of what industries to delicense was made at the central level, this effectively provides an exogenous source of change in the possible extent of collusive behaviour at the state level.

b) Whether the private sector umbrella association has a **regular publication** informing its members. This measure captures the transparency of the organization's activities. Higher transparency would be associated with lower probability of collusive behaviour which may harm business not entrenched with public authorities.

c) The **frequency** with which the publication is produced and distributed. As in the case of the organization's website, this frequency would also determine the level of transparency in the association's activities.[11]

As CMP correctly argue, the indices constructed through these variables have two main advantages over the traditional investment climate indicators. First, they cover a larger time span than any other indicators on India states. This allows one to examine the evolution of the relevant economic institution over different periods. Second, by not being based on firms' perceptions, they avoid the measurement error problem typical of subjective survey response data. Bertrand and Mullainathan (2001) argue that the likely causal correlation of this measurement error with dependent variables may generate biased estimated coefficients.

CMP normalize the data so as to make the individual variables vary over a common range and to make the increase in a variable signal an improvement in the index. Then they use equal weights for each of the sub-components of the four dimensions of effective SBRs to arrive at the four components of SBR Private, SBR Public, SBR Practice and SBR Collusive, which are then aggregated to obtain the overall SBR measure.[12]

In Fig. 2, we present the period averaged SBR index for 1994-2000 and 2001-2005 respectively As is clear, there are strong differences in the effectiveness of state business relations across Indian States. These differences though seem to have persisted over time, but some states, such as Assam, Karnataka, Andhra Pradesh among others have shown remarkable improvement over the period.

[11] This variable is coded analogously to the frequency of website update.

[12] To obtain the SBR Private component, the apex business association is given a weight of 1 and the two sectoral associations were given zero weights. CMP experiment with different weights for apex and sectoral business associations and find that there is a strong correlation between SBR measures obtained under different weighting schemes. We adopt the weights of 1 for the apex business association and 0 for the sectoral business associations for the main regressions but our results are also robust to the use of SBR indices calculated through different weights (i.e. assigning the same weight of one third to each, or assigning 0.5 weight to the apex body, and 0.25 each to the two leading sectoral business associations).

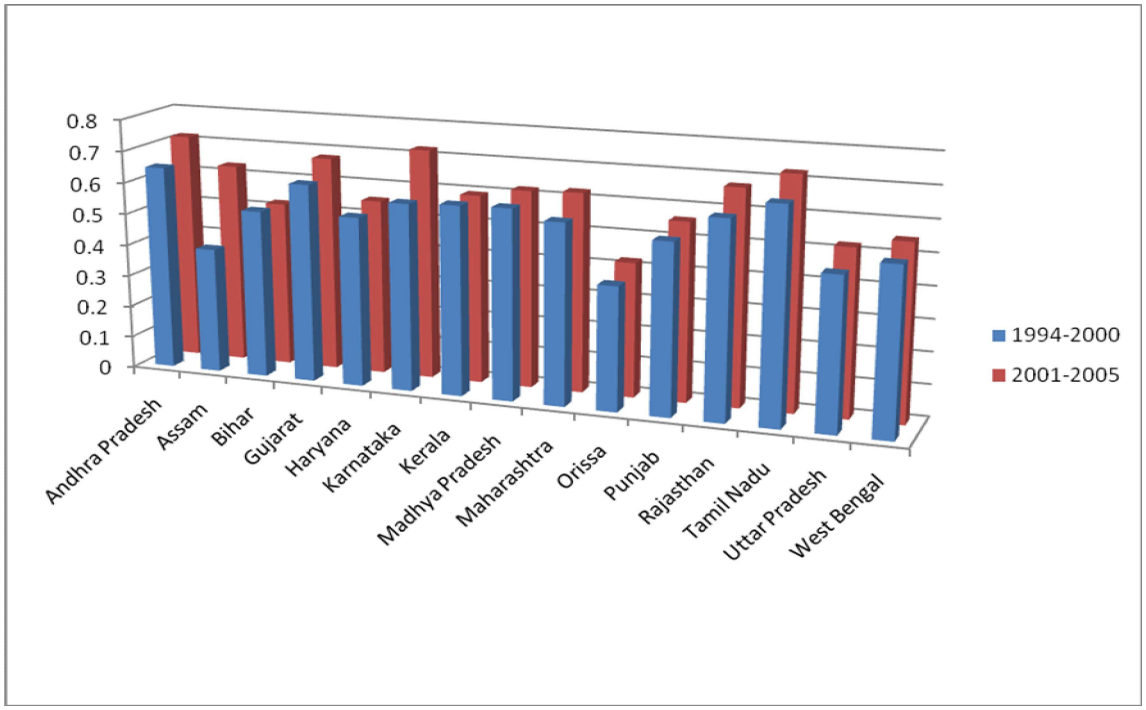

Fig. 2. Measure of effective state business relations across Indian states

V. Data and Variables

Data for the productivity estimation

A key feature of the present paper is the use of firm level data for both formal and informal manufacturing sector. The data for the informal manufacturing sector for the selected States are obtained from the National Sample Survey Organization (NSSO) surveys on the informal manufacturing sector for 1994-95, 2000-01 and 2005-06.[13] In order to compute TFPG for a sector, data for the same 3 years for the formal sector are obtained from the Annual Survey of Industries (ASI).[14] We have aggregated the unit level data to arrive at the four-digit National Industrial Classification industry level data for each state. The four-digit National Industrial Classification (NIC) used by the Indian statistical agencies is equivalent to the ISIC five digit level. To use the Levinsohn-Petrin technique, we considered only those industries for which 3 year data was available. While aggregating the data up to four digit level, we have omitted units reporting zero or negative capital stock, zero output and zero employment.[15]

[13] The NSSO conducts surveys on the informal manufacturing sector quinquennially. Though the NSSO initiated this survey in 1978-79, a complete firm level dataset was available only from 1994-95. This fits well with our objective too.

[14] It is important to note here that at the time of the analysis the ASI data for 2005-06 was yet to be released. On account of it, we have considered the ASI dataset for the year 2004-05.

[15] In 2000, Bihar, MP and UP were bifurcated and three new States - Uttrakhand, Chattisgarh and Jharkhand were formed, for the present analysis, these three States were merged with their parent States so as to have consistent data for all the three time periods.

Variables

The variables used in TFP estimates are output, labour, capital, and intermediate inputs. To make the values of output, capital and intermediate inputs comparable over time and across industries and States, suitable deflators have been used as discussed below.

Output: As in common in the literature, gross value added (GVA) is used as the measure of output in this study (Goldar, 1986; Ahluwalia, 1991; Balakrishnan and Pushpangadan, 1994, 1998). The advantage of GVA over gross output as a measure of output is that it allows comparison between the firms that are using heterogeneous raw materials (Griliches and Ringsted, 1971) and takes into account differences and changes in the quality of inputs (Salim and Kalirajan, 1999). We also use the single deflation method (where nominal value added is deflated by the output price index) in estimating real GVA rather than the double deflation method (where the output and material inputs are deflated separately) due to the nonavailability of industry specific input deflators. For the output price deflator, we use the industry specific wholesale price index.

Capital: We have used the total fixed assets as given in the ASI and NSSO reports to represent capital[16] input in the formal and informal sectors respectively. The total fixed assets are deflated by WPI for machinery and machine tools in both the sectors. The WPI for machinery and machine tools are not available at the industry level forcing us to use the values at the all India level. The values are expressed in 1993-94 prices.

Labour: Total number of persons engaged is used as the measure of labour input. Since working proprietors / owners and supervisory/managerial staff have a significant influence on the productivity of a firm, the number of persons engaged was preferred to the total number of workers.

Data for the growth equation estimation

The control variables for the TFP growth equation estimation are import-penetration and export orientation ratios, and the Herfindahl-Hirschman index (HHI). Data on exports orientation and import penetration are obtained from Nicita and Olarreaga (2006). These data are at the 3-digit ISIC level and are matched to the NIC 2-digit industry level. As exports and imports data are reported in US dollars, we converted them to Indian Rupees using the dollar-rupee exchange rates prevailed during the selected sample years. These figures are then deflated using WPI for manufactured products at the two-digit industry level. All values are expressed in 1993-94 prices. Data on HHI are drawn from the PROWESS database of the Centre for Monitoring Indian Economy (CMIE).

The specific variables used in the regressions are:

[16] The capital input includes land, buildings and other construction, plant and machinery, transport equipment, tools and other fixed assets that have a normal economic life of more than one year from the date of acquisition.

Import penetration ratio (IMPEN): for a particular industry is defined as the ratio of its imports to domestic demand and is calculated as: IMPEN = Real imports / Domestic demand, where Domestic demand = Real output + Real imports – Real exports

Export orientation ratio (EXPOR): for a particular industry is the ratio of its exports to its output. It is given as: EXPOR = Real exports / Real Output

Herfindahl-Hirschman Index (HHI): HHI is an indicator of the extent of competition among firms in an industry. It is defined as the sum of the squares of the market shares of the 50 largest firms (or summed over all the firms if there are fewer than 50) within the industry. The index can vary from zero to one with increases in the HHI reflecting a decline in competition and an increase of market power and *vice versa*.

Table 2 gives the summary statistics for the SBR, trade and competition variables for the two time periods – 1994-2000 and 2001-2005. We can easily infer the following: a) carrying out business has become somewhat easier, as SBR variables have increased over the period (row 1); b) though trade restrictions on the manufacturing sector has lessened over time, this has not led to increased import penetration or export orientation (rows 2, 3, 5 and 6); and c) competition has increased in the Indian manufacturing sector, as evident from the decline in HHI (row 4).

Table 2. Average values for SBR, trade and competition variables

	Variable	1994-2000	2001-2005
1	SBR	0.54	0.59
		(0.111)	(0.124)
2	HHI	0.17	0.164
		(0.108)	(0.103)
3	IMPEN	0.096	0.096
		(0.138)	(0.138)
4	EXPOR	0.132	0.0398
		(0.189)	(0.064)

Note: Figures in parentheses are standard deviation.

Productivity growth estimates

The section now gives the productivity growth estimates. The estimates are obtained using production function approach, where the function is estimated for 15 major Indian States using LP method separately for formal, informal and combined sectors using four-digit industry level data for the three time periods.[17]

Tables 3, 4 and 5 give the TFPG[18] estimates for formal, informal and combined manufacturing sectors respectively. The TFP grew steadily in the formal manufacturing sector over the period 1994-2005 (Table 3). A comparison of TFPG during 1994-2001 and 2001-2005 reveals that TFP growth accelerated in the latter period as compared to the former. The average annual TFPG for the 15 States was 0.04 per cent in the first period, which increased to 3.14 per cent during the second period. We also find that the aggregate growth masks the inter-regional differences in productivity growth.

[17] The estimation is carried out in STATA 11.

[18] It is to be noted that wherever growth rate has been computed in Table 3 or elsewhere, it is the compound annual growth rate (CAGR) for the period. The CAGR is calculated as $[(Y_t/Y_o)^{(1/t)}-1]*100$, where Y_t and Y_o are the terminal and initial values of the variable and 't' is the time over which CAGR has to be calculated.

Table 3. Total factor productivity growth in the formal sector

State	1994-2001		2001-2005		1994-2005	
	Mean	SD	Mean	SD	Mean	SD
Punjab	1.74	22.81	2.22	21.7	3.04	10.64
Haryana	-2.97	22.43	2.56	31.47	-1.79	15.7
Rajasthan	-0.73	22.46	1.09	36.87	-1.96	22.38
UP	-1.28	19.05	6.65	24.24	1.29	10.53
Bihar	-0.94	24.71	-3.8	27.02	-5.24	22.16
Assam	3.89	32.78	1.66	22.33	4.06	10.34
WB	-0.59	14.37	4.82	42.77	-0.94	14.16
Orissa	-0.08	16.07	1.23	27.11	-0.69	18.37
MP	6.31	28.54	0.71	22.14	4.69	11.58
Gujarat	5.52	30.34	0.74	29.15	5.2	17.9
Maharashtra	-6.17	8.86	5.14	17.08	-1.64	6.63
AP	-1.32	11.87	9.57	40.13	1.71	7.5
Karnataka	-0.16	20.34	8.2	51.56	2.83	10.95
Kerala	0.47	14.12	3.13	20.09	-0.31	12.1
TN	-3.11	11.54	3.25	24.25	-0.58	6.91
Mean	**0.04**		**3.14**		**0.64**	

Notes: * estimated from the data without outliers.[19]

We notice a completely different picture with regard to TFP growth in the informal manufacturing sector (Table 4). TFP reported a steady decline over the period 1994-2005. The decline that started during 1994-2001 continued unabated in the period 2001-2005 with a decline of 16 per cent in this period. Majority of the States registered TFP decline in both the periods.

Table 4. Total factor productivity growth in the informal sector

State	1994-2001		2001-2005		1994-2005	
	Mean	SD	Mean	SD	Mean	SD
Punjab	-7.69	10.39	-3.72	24.57	-6.25	12.02
Haryana	-8.91	10.55	-11.04	21.26	-10.63	10.69
Rajasthan	-7.6	10.23	-11.48	20.51	-9.96	10.1
UP	-2.8	21.58	4.44	20.83	0.6	9.51
Bihar	0.74	24.26	-13.75	31.26	-8.48	22.2
Assam	-3.89	10.92	-32.52	12.27	-18.33	7.73
WB	-4.54	8.49	-10.75	21.38	-8.48	10.55
Orissa	-6.67	10.4	-34.18	9.74	-20.29	4.59
MP	7.99	32.95	-4.06	23.38	4.92	14.92
Gujarat	-2.51	12.06	-19.38	16.9	-10.7	8.83
Maharashtra	-2.45	10.22	-4.74	22.7	-4.03	12.06
AP	-3.08	9.88	-26.98	16.26	-14.73	9.08
Karnataka	-3.64	10.79	-26.52	15.2	-15.26	9.52
Kerala	-13.7	12.39	-22.21	14.3	-17.94	8.89
TN	-1.42	6.96	-23.14	19.21	-12.59	9.63
Mean	**-4.01**		**-16.0**		**-10.14**	

Notes: Same as Table 3.

[19] On checking standard deviation of TFPG, it was found that for some States, few industries were influencing TFPG. The present table gives TFPG estimates after omitting these industries. .

Table 5. Total factor productivity growth in the combined sector (formal + informal)

States	1994-2001		2001-2005		1994-2005	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Punjab	-0.46	21.06	-1.46	23.45	0.73	10.46
Haryana	-5.69	22.1	0.61	26.55	-3.34	14.82
Rajasthan	-0.8	22.95	-0.69	28.06	-1.29	17.82
Uttar Pradesh	-1.27	19.06	4.74	19.11	1.08	9.57
Bihar	-0.68	24.38	-6.04	22.21	-5.98	20.57
Assam	3.02	32.01	-8.31	24.58	-1.39	13.63
West Bengal	-1.96	13.13	1.4	27.84	-1.94	13.19
Orissa	0.9	26.45	-6.35	25.85	-4.54	18.83
Madhya Pradesh	2.8	26.49	2.27	18.62	3.52	9.86
Gujarat	-0.79	26.27	24.8	219.8	2.36	15.66
Maharashtra	-6.37	9.58	3.38	14.79	-1.39	6.73
Andhra Pradesh	-2.42	12.19	4.94	31.77	-0.12	8.39
Karnataka	-0.7	14.81	2.42	25.89	1.16	8.99
Kerala	-4.32	11.83	1.35	18.78	-3.31	12.03
Tamil Nadu	-3.63	11.34	0.74	21.73	-1.1	6.49
Mean	**-1.49**		**1.59**		**-1.04**	

Notes: Same as Table 3

As regards the combined manufacturing sector, TFP registered a turnaround in the second period, 2001-2006. TFP switched over from a negative growth of 1.5 per cent per annum in 1995-2001 to a positive growth rate of 1.6 per cent per annum during 2001-2006.

VI. Estimation of the TFPG Growth Equation - Results

Table 6 gives results for the combined manufacturing sector. We present the results for the relative change in these variables (i.e., log differences) rather than the absolute values. The choice of log differences is dictated by the fact that any productivity shock in a period will be governed more by the changed trade regime or competition instead of the actual regime.[20] Further, SBR variable is in the form of 1+logSBR. Given the fact that SBR ranges between zero and one, unit value was added so that its log gives positive SBR.

[20] We also experimented with used these variables in average form and the beginning of the period. The results are not reported but in all these models, coefficient and significance of the SBR variable hardly changed.

Table 6. SBR and productivity growth across Indian states, robust estimations: combined manufacturing sector

	Variables	Model 1	Model 2	Model 3	Model 4 (IV)
1	SBR	103.27*	20.14*	15.51*	20.04*
		(27.83)	(10.14)	(8.68)	(9.94)
2	HHI	-7.00	8.42	--	8.37
		(35.19)	(20.08)		(20.08)
3	IMPEN	-196.75	13.21	--	13.39
		(160.20)	(87.46)		(87.16)
4	EXPOR	35.40	-0.002	--	0.097
		(57.06)	(38.28)		(38.07)
5	Outlier	--	2980.60*	2850.83*	2980.65*
			(290.26)	(240.81)	(290.28)
6	Year effect	Yes	Yes	Yes	Yes
7	Industry effects	--	--	Yes	--
8	R Squared	0.02	0.75	0.74	0.75
9	N	1751	1751	2754	1751

Notes: * indicates significance at minimum 10% level; Figures in the parentheses are SE; the results are obtained after correcting for heteroskedasticity if any; the number of observations in Models 1, 2 and 4 are less because for some of the industries we do not have data on trade and competition variables.

From the table, it is clear that state-business relation (row 1) is key factor in influencing the TFP growth of Indian industry (Model 1). However, none of the trade variables and competition variable is significant though, they have come with the right sign (rows 2, 3 and 4). One possible reason for trade variables not attaining significance is the fact that major trade reforms were carried out in 1991, with little variation in the trade regime since the early 1990s.[21] Another reason for the variable not affecting TFPG is the level of disaggregation of trade variables used,[22] which being at three digit levels whereas TFPG is computed at the four digit level. Same is the case with HHI, which too has been computed at the three digit level.

A closer look at the TFPG estimates indicates that a few industries have very high TFPG during the period. It is possible that these industries might be driving the SBR results. The inclusion of a dummy for these outliers industries (Model 2) not only improves our estimates, the explanatory power of the model also increases. As a further robustness test, we include only industry dummies instead of IMPEN, EXPOR and HHI, to capture industry-specific intrinsic technological progress that may affect TFPG. The inclusion of industry dummies (instead of trade and competition variables) does not change the results (Model 3). The SBR variable is robust to these alternate specifications.

Testing for potential endogeneity

[21] We have also used simple and weighted tariff rates instead of import penetration and export orientation, with no change in our results on the lack of significance of the trade variables.

[22] Including trade variables at higher aggregation is because it is very difficult to obtain at such a disaggregated level of industrial classification.

One potential concern with our results is that the SBR variable may be endogenous to productivity growth in a particular state. There are two possible ways that this may happen. More productive industries may be able to organize themselves better and bring out more effective SBRs. Also, the presence of good SBRs in a particular state may lead to more productive firms from other states to relocate to that state. In order to control for the potential endogeneity of the SBR variable, we used two sets of instruments: one based on land reform legislation enacted by Indian states in 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 legislation, according to which states are granted the powers to enact (and implement) land reforms. There are significant differences in the intensity with which states have enacted the various types of land reform legislation over time. We use the measure of intensity of land reform across different states as constructed by Besley and Burgess (2000). Since there has not been any major land reform legislation since 1992 (see World Bank, 2007), we retain the same values for the land reform variable for the post-1992 period. We postulate that the political process underlying SBR was the mirror image to that underlying land reform legislation. States which 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 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 by Besley and Burgess (2000). We express these as a share of total seats in the legislature. We use average of the preceding 4 years to decrease the potential concern about their endogeneity.

Model 4 in Table 6 are the results of the instrument variables (IV) estimations to account for potential endogeneity. The coefficients for SBR and other variables however do not change. Thus, endogeneity is not a problem with our estimations. This is also verified by Wooldridge's (1995) robust score test, which is not significant, thereby rejecting endogeneity.

To see the robustness of results, we experimented with different specifications of SBR. The results, though not reported, are fairly robust to irrespective of how we include different trade and competition variables. We also include a dummy for 'Left' oriented governments and a dummy for states which have seen to be backward in nature, termed as the BIMARU states (literal meaning 'sick').[23] Our SBR results are robust to these controls.

[23] These states are Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh. Left oriented governments have been been in place in Kerala and West Bengal.

Effect of SBR on formal and informal manufacturing

The results thus indicate that institution of state-business relation has positively impacted the TFP growth of Indian industry. However, the way SBR has been constructed (refer section 4), it is more akin to measuring the effectiveness of formal organizations whether they are in the domain of the State or of the private sector. Therefore, the effect of SBR should be mainly on the formal manufacturing; the informal sector is less likely to benefit from effective SBRs. Moreover, given the duality in Indian manufacturing sector (Mazumdar and Sarkar, 2008), the informal sector may not be affected by even trade related reforms or the prevailing competitive market structure. Thus, it is important to carry out estimates for formal and informal manufacturing sector separately. Tables 7 and 8 give results for formal and informal manufacturing sectors respectively. The scheme of analysis is same as followed in combined manufacturing.

Table 7. SBR and productivity growth across Indian states, robust estimations: formal manufacturing sector

	SBR measure	Model 1	Model 2	Model 3	Model 4 (IV)
1	SBR	241.74*	73.98*	61.2*	72.52*
		(76.62)	(36.53)	(31.93)	(35.7)
2	HHI	-24.09	65.23	--	65.23
		(73.0)	(83.31)		(83.31)
3	IMPEN	-228.05	97.78	--	100.6
		(417.29)	(317.92)		(316.52)
4	EXPOR	-13.77	19.37	--	20.89
		(123.1)	(139.30)		(138.58)
5	Outlier	--	6110.15*	5622.54*	6110.93*
			(1057.18)	(809.4)	(1057.3)
6	Year effect	Yes	Yes	Yes	Yes
7	Industry effects	--	--	Yes	--
8	R Squared	0.02	0.49	0.49	0.49
9	N	1687	1687	2572	1687

Notes: Same as Table 6

As conjectured, SBR is found to have significant effect on the TFPG of formal sector (Table 7). The coefficient of SBR variable for the formal manufacturing sector (row 1, Table 7) becomes more meaningful when we control for few industries having abnormally high TFPG (Models 2 and 3). With respect to trade and competition variables, none of them is found to have any impact on TFPG for the formal sector variable. Contrary to our expectation, for informal sector, in one of the specifications, with industry dummies instead of trade and competition variables, the results indicate that effective SBR in the state leads to a decline in TFPG (Model 3). One possible reason could be the potential endogeneity of SBR. The Wooldridge (2005) endogeneity test for the informal sector confirms weak endogeneity. The IV results change accordingly (Model 4). The IV estimation, however do not change the result for formal manufacturing, indicating no endogeneity. It is quite possible that a favourable business climate may be signaling firms in informal sector to relocate to the states having good SBR.

But once re-located, they may not gain much as the presence of effective SBR in the state primarily affects the formal manufacturing sector.

Table 8. SBR and productivity growth across Indian states, robust estimations: informal manufacturing sector

	SBR measure	Model 1	Model 2	Model 3	Model 4 (IV)
1	SBR	18.18	-5.19	-13.28*	-4.62
		(13.53)	(4.30)	(4.31)	(4.3)
2	HHI	-39.95*	9.47*	--	9.67*
		(21.40)	(5.53)		(5.58)
3	IMPEN	20.22	25.24	--	23.96
		(102.24)	(40.76)		(40.54)
4	EXPOR	90.16*	-12.09	--	-12.62
		(44.76)	(15.40)		(0.82)
5	Outlier	--	3277.28*	3275.0*	3277.07*
			(610.81)	(606.9)	(610.76)
6	Year effect	Yes	Yes	Yes	Yes
7	Industry effects	--	--	Yes	--
8	R Squared	0.02	0.74	0.74	0.74
9	N	1291	1291	2112	1291

Note: Same as Table 6

On the basis of results, we can say that effective SBR has a direct impact on the TFPG of the manufacturing sector. The effect however is confined to the formal sector only. This supports that there exist duality in Indian manufacturing. The formalized institutions and organizations involving the state and the business sector that affect productivity of the formal sector may not have much relevance for the informal sector.

VII. Conclusions

In contrast to previous studies that have examined the effects of trade and market structure on productivity growth in industry, in this study, we address the role of institutional quality as captured by effective state-business relationships (SBRs) in influencing sectoral productivity. Our empirical context is India, where India's federal structure and the significant political autonomy and independence in legislative powers enjoyed by State governments, along with regional variations in the collective strength of the economic and political elite allows for the variation in effective state-business relations across Indian States and over time. We use measures of effective SBRs developed by Cali, Mitra and Purohit (2009) for 15 Indian States over the period 1994-2005 and determine whether variations in the effectiveness of SBR both across States and over time can explain total factor productivity growth in Indian manufacturing, independent of variables that capture trade open-ness and market structure across disaggregated Indian industries. A key feature of the present paper is the use of unit level data for both formal and informal manufacturing sector.

The study employs a Cobb-Douglas production function to estimate TFPG for nearly 90 industries for 15 major States in India for formal, informal and combined sectors using four-digit level data. To correct the endogeneity bias associated with the production function estimation, we use a method recently developed by Levinsohn and Petrin. The TFPG estimates as obtained from the production function are then used to see the effect of SBRs.

TFP grew steadily in the formal manufacturing sector while reported a decline in the informal manufacturing sector. The results indicate that SBR has positively affected the TFP growth of Indian

industry. To see how duality between the formal and informal sectors affects SBR influence, the estimates are carried out for formal and informal manufacturing sector separately. SBR is found to have no effect on the TFPG of informal sectors. The coefficient of SBR variable for the formal manufacturing sector is not only significant in all the variants but also at least 4-5 times that of the coefficient for the informal manufacturing sector. We also find that our results are robust to alternate specifications and to possible endogeneity concerns to do with the SBR measure. Our results suggest that independent of policy measures that bring out trade openness and greater competition, there is a role for stronger and more synergistic relations between the state and the private sector to bring about sustained increases in productivity and consequently in standards of living.

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