Caught in the web? How regulatory reforms shape firm performance in India

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Abstract

This study examines the interaction between regulation, corruption and firm performance in India through the lens of 'Public Choice Theory'. We show how deregulation curbs the discretionary powers enjoyed by public inspectors, and result in better firm performance. Using the World Bank Enterprise Survey panel dataset, we show that easing regulatory burdens reduces corruption. Additionally, employing unit-level panel data from the Annual Survey of Industries for 2001-2020, we assess the impact of amendments to the Industrial Disputes Act (1947) on the performance of formal manufacturing firms in India. Specifically, we exploit the variation in the implementation of the IDA amendments across Indian states with the conjecture that firms located in states where the amendments took place were able to escape the grabbing hands of the public inspectors who exercise discretionary powers over various firm activities. Our staggered Difference-in-Differences estimations reveal that firms in states that enacted amendments to the IDA (1947) (u/s 25 K of V-B) witnessed higher growth in fixed capital, employment, and labour productivity compared to firms in states that did not amend the Act. Thus, states proactive in implementing reforms that reduce corruption at the firm level tend to benefit more than their counterparts. Easing regulations improve firm performance, probably through reduced inspections by corrupt officials which potentially lowers opportunities for corruption. We identify that limiting the monopoly powers of public officials is a key channel for controlling corruption. We inform policy-makers on how relaxing laws can help firms escape the 'grabbing hands' of inspectors and thus be beneficial.

Keywords: Regulation, Corruption, Firm Performance, Instrumental Variable estimation, Panel data models, Staggered Difference-in-Difference

JEL Codes: K2, D73, L25, C33, C36

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1. Introduction

The theory of Public Choice lays the foundation for understanding the interface between the bureaucracy and the political environment, emphasizing the self-interest of actors in the economy. Governments often formulate rules and regulations to check and balance these self-serving actions. While regulations seek to prevent individuals from making choices that could be harmful or self-serving, excessive regulations can lead to adverse outcomes. A stringent regulatory environment increases the likelihood of firms and individuals circumventing such regulations through bribery (Dunlop and Radaelli, 2019). In other words, excessive government intervention creates opportunities for corruption (Rose-Ackerman, 1999), as without regulations, there would be no regulators to bribe (Goel and Nelson, 2010). Government officials, empowered to enforce these regulations, may exploit their positions to extort bribes (Bliss and Di Tella, 1997; Kohler et al., 2016), a phenomenon Shleifer and Vishny (1993) described as the 'grabbing hand' of government.

Corruption is closely linked to the nature of regulations in place. Recent studies highlight a positive relationship between government regulations and firm-level corruption[1] (Goel and Nelson, 2010; Halcombe and Boudreaux, 2015; Amirapu and Gechter, 2020; Dincer and Gunalp, 2020; Breen and Gillanders, 2022). For instance, Amin and Soh (2021), using World Bank Enterprise Survey data from 132 countries, found that a one percentage point increase in regulatory burden leads to a 0.03 percentage point rise in the bribery rate. While some studies suggest a simple linear relationship, others argue that the link between regulation and corruption is more complex than it seems (Fazekas, 2017). Although certain studies point to a bi-causal relationship (Breen and Gillanders, 2012, 2022; Amirapu and Gechter, 2020), others research argues that regulations encourage corruption, and the expectation of bribes, in turn, prompts the imposition of more regulations, creating a loop of unending interactions (Rose-Ackerman and Palifka, 2016; Breen and Gillanders, 2022).

Restrictive labour regulations are often seen as contributing to low employment (Botero et al., 2004; Djankov and Ramalho, 2009) and low productivity in the formal sector (Hsieh and Klenow, 2009). Empirical evidence shows that regulations affect the formation of new firms

[1]We consider firm-level corruption an indicator of bureaucratic quality for two reasons: first, the public officials that firms deal with enforce the rules, and thus form part of the bureaucracy in a federal set-up like India. Second, these officials exert control over firms through their discretionary power. They can over-report violations to create problems for firms to extract bribes (Banerjee, 1994; Mishra and Mookherjee, 2013; Asher and Novosad, 2017). Thus, the behaviour and conduct of public officials inevitably affect firm performance.

and the employment levels of incumbent firms (Bailey and Thomas, 2017; Dove, 2023). Paunov (2016) finds that extortion has a statistically significant negative impact on firms' ownership of quality certificates and investment in machinery. De Chiara and Manna (2022) conclude that corruption under a strict regulatory regime can mitigate over-investment issues, but at the cost of welfare losses. Thus, stringent regulations often do more harm than good to firms.

Our paper seeks to unravel the complex relationship among government, bureaucracy, and firms by focusing on a contentious regulation — the Industrial Disputes Act (IDA) of 1947, which governs labour laws in India (Besley and Burgess, 2004; Bhattacharjea, 2009; Amirapu and Gechter, 2020). The IDA has attracted significant attention from researchers and policymakers, particularly due to its controversial provisions. Over the past few decades, the IDA has undergone various amendments, especially in areas related to wage fixation, the balance of power between workers' unions and firm owners, and provisions governing strikes and lockouts. In this paper, we focus on a recent amendment to *Section 25 K of Chapter V-B*, which lays out special provisions relating to layoffs, retrenchments, and closures in establishments employing at least 100 workers on average over the preceding year. This amendment raised the threshold from 100 to 300 workers, meaning firms with up to 300 workers now do not require government permission to close or lay off workers.

Since the administration of the IDA is shared between central and state governments, amendments may or may not be implemented uniformly across Indian states. In a decentralised democracy such as India, state governments have autonomy in deciding whether to amend labour laws, resulting in inconsistent implementation across states. As a result, amendments to *Section 25K of Chapter V-B* were implemented in a staggered manner. We hypothesize that this staggered implementation has implications for firm performance, particularly through the channel of corruption. In states where the amendment was enacted, firms employing between 100 and 300 workers should face reduced inspection by labour inspectors, potentially lowering opportunities for corruption.

This paper aims to unwind the intricacies of government regulations, bureaucratic corruption, and firm performance. It is motivated by the inconclusive nature of the relationship between regulation and corruption in developing countries, particularly in India. Specifically, we analyze how easing regulatory burdens affects the performance of formal firms in India. Our hypothesis is that reducing regulatory burdens lowers corruption which, in turn improves firm

performance. Our findings show that firm-level bribery negatively affects firm growth in India, and easing regulatory burdens reduces corruption. The staggered Difference-in-Differences (DiD) results show that states enacting reforms that curb corruption reap greater benefits than others. These findings are robust to alternative specifications and sub-sample analyses.

The remaining paper is organized as follows. Section 2 reviews the existing literature on regulation and corruption, with special focus on firm-level studies. To put things into perspective, we provide a brief description of the Industrial Disputes Act (1947) in Section 3. We discuss the data, methods and variables used in section 4. The section also discusses the possible endogeneity bias in our OLS estimation and the potential strategies (IV method and staggered DiD technique) to overcome it. Section 5 interprets the results. Section 6 presents the robustness checks conducted. Finally, Section 7 concludes.

2. Literature Review

There is extensive literature on the nexus between regulation and corruption, in both developed and developing countries (Amirapu and Gechter, 2020; Dincer and Gunalp, 2020; Breen and Gillanders, 2022). It is often observed that more government regulations create opportunities for corruption by providing discretionary powers to public officials (Goel and Nelson, 2010; Holcombe and Boudreaux, 2015; De Chiara and Manna, 2022). Stringent regulations enable inspectors to extract bribes. Amirapu and Gechter (2020) argue that corruption increases the 'implicit costs' of doing business in developing countries due to more frequent interactions with labour inspectors wielding significant discretionary power. They find that these 'de facto' costs are reduced in states where the power of inspectors is limited.

Holcombe and Boudreaux (2015) show that high levels of regulation lead to more corruption, with the regulatory state – not the productive or redistributive state – being linked to corruption. Similarly, Dincer and Gunalp (2020) found a positive and statistically significant association between regulation and corruption. Amin and Soh (2021), using the World Bank Enterprise Survey data for 132 countries, demonstrate that for every percentage point increase in regulatory burden, the overall bribery rate increases by about 0.03 percentage points.

Other studies have examined the impact of regulations on firm performance. Paunov (2016) finds that extortion negatively affects firms' ownership of quality certificates and investment in machinery. De Chiara and Manna (2022) suggest that under a strict authorization regime, the issue of over-investment can be avoided through corruption but results in welfare losses.

Chambers et al. (2022) report that a 10% increase in industry-specific regulatory restrictions results in a 0.5% reduction in the number of firms, regardless of firm size, with regulations harming small firms more than large firms. Bailey and Thomas (2017) and Dove (2023) examine US industries and conclude that burdensome regulations stifle entrepreneurial activity and job creation. Aidt and Dutta (2008) contend that entrepreneurs bribe politicians to create obstacles for new firms entering the market.

The impact of corruption on firm performance remains debated. While some argue that corruption can be efficient (Dreher and Gassebner, 2013; Williams and Martinez-Perez, 2016), most studies suggest its negative effects outweigh any benefits (Kato and Sato, 2014; De Rosa et al., 2015; Chhetri and Raj, 2024). De Rosa *et al.* (2015) find that bribing firms are approximately 5% less productive than non-bribing firms. Fisman and Svensson (2007) also observe that a one-percentage point increase in bribes leads to a three-percentage point reduction in firm growth – a higher impact than taxation.

In India, research on corruption and firm performance is limited, with most studies relying on WBES data. Sharma and Mitra (2015) report that bribery negatively affects firm growth, except for export producers, while firms evading taxes pay higher bribes. Raj and Sen (2017) use WBES data to show that corruption reduces firm productivity. Jain (2020), addressing methodological issues using 2SLS to overcome endogeneity, finds that bribery harms firm profitability and labour productivity. More recently, Chhetri and Raj (2024) employ an Endogenous Switching Regression model, finding significant heterogeneity in the impact of bribery, emphasising that firms' (dis)engagement in bribery is a conscious, strategic and rational choice. However, the literature frequently highlights the challenges of accurately capturing corruption due to its covert nature and remains inconclusive on its firm-level effects.

Acknowledging these challenges, this paper examines the relationship between regulation, corruption, and firm performance. We examine how restrictive regulations may fuel corruption and probe the implications of reducing firms' interactions with inspectors to curb bribery and promote firm growth.

3. The Industrial Disputes Act (1947)

The IDA regulates labour laws in India, especially those pertaining to employers, trade unions, and individual workers within the Indian mainland. It provides various mechanisms and procedures to settle industrial disputes through conciliation, arbitration, and adjudication,

aiming to maintain a harmonious and peaceful work culture within the industry. The Act includes provisions related to the payment of compensation to workers in the event of closure or retrenchment, procedures to be followed when a factory decides to stop operations, and actions to be taken against misconduct or unfair labour practices. The IDA consists of seven distinct chapters, each addressing a specific aspect of industry-labour relations. For instance, Chapter 1 provides definitions of key terms, Chapter 2 lists the authorities under the Act, Chapter 3 provides the references of disputes, Chapter 4 discusses the powers and duties of these authorities, and so on.

A major challenge the IDA faces is balancing the aspirations of the labour force with those of the industry. Amendments to the IDA have implications for both labour and industry welfare. Studies in the Indian context have categorised these amendments –as either pro-worker, pro-employer, or neutral, leading to fierce debates in policy circles (Besley and Burgess, 2004; Bhattacharjea, 2006; Roy et al., 2020). However, our study deviates from existing literature by examining the linkage among stringent labour regulations, corruption, and firm performance. Our focus is primarily on the amendments made under *Section 25K of Chapter V-B*, which outline special provisions relating to layoffs, retrenchments, and closures in establishments employing a minimum of 100 workers. These amendments have raised the threshold from 100 to 300 workers in some states implying that firms employing fewer than 300 workers now do not require government permission to close or lay off workers.

4. Data, Variables and Methods

4.1 *Data Source*

This study relies on two key data sources: the World Bank Enterprise Survey (WBES) and the Annual Survey of Industries (ASI). Each dataset serves a specific purpose, and together they present a comprehensive picture of the interconnectedness between regulation, corruption and firm performance. We use the WBES data to explore the direct link between corruption and firm performance using OLS and IV methods. The WBES panel data (2022) serves a dual role – first, to forge the link between regulation and corruption, second, to understand how improvements in firms' perceptions of corruption results in better performance. Additionally, the ASI panel data (2001-2020) is employed to examine the impact of regulatory changes on firm performance through the corruption channel. Below, we briefly discuss each dataset.

World Bank Enterprise Survey (WBES)

The study relies on enterprise surveys conducted by the World Bank[2] (henceforth, WBES) to identify obstacles faced by firms. The WBES provides data on a representative sample at the firm level[3] in the non-agricultural sector (Martins *et al*., 2020). A stratified random sampling with replacement is followed, with firm size, geographical region, and sector as the strata (Dethier *et al*., 2011; Martins *et al*., 2020). This stratification ensures adequate coverage of small and medium-sized firms. The survey presents a wide range of qualitative and quantitative firm-level information that include subjective evaluations of obstacles and objective data linked to growth and productivity. It covers various aspect such as the nature of the business, access to loans, regulatory obstacles to growth, and corruption. It also provides general information on firm size, age, legal status, location, sales, and employment. Studies on India have used the WBES to examine the relationship between corruption and firm performance (Sharma and Mitra, 2015; Raj and Sen, 2017; Jain, 2020; Chhetri and Raj, 2024). The recent WBES panel data for India, covering firms in 2014 and 2022, is employed in our study to make it more robust.

Annual Survey of Industries (ASI)

The ASI[4] is the principal source of industrial statistics in India. It includes all units employing 10 or more workers with power or 20 or more workers without power, registered under sections 2(m)(i) and 2(m)(ii) of the Factories Act, 1948. It provides information related to firm investment, output, input, gross value addition, employment, wages, and number of factories, among other variables. It also provides data on the type of ownership, type of organization, location, sector, and the year firms started their operations. Previously, studies using the ASI firm-level dataset faced difficulties in constructing firm-level panel data due to the lack of common factory identifiers. However, the ASI now provides panel data with a "common factory identifier" upon request, which we use in this study. Our balanced panel consists of 1689 firms that were surveyed for 20 years resulting in 33,780 total samples. We restrict our

[2]Among all the sources of corruption data, the WBES stands out. It allows us to link the cause and effects of corruption to firm characteristics.
[3] More details are available at https://www.enterprisesurveys.org/en/data.
[4]For more information, visit the website (https://www.mospi.gov.in/annual-survey-industries). Also see Chandrasekhar (2001) for a detailed discussion on the ASI dataset.

analysis to 21 major states (excluding the northeastern[5] states, Goa, and Union Territories[6]) for the period 2001-2020.[7]

The ASI data[8] provide firm performance measures in current prices; thus, it is crucial to deflate these measures using appropriate deflators. We use two major firm performance indicators from the ASI panel dataset that need to be deflated[9] Fixed Capital (deflated using WPI of Machinery and Machine Tools) and Gross Value Added (deflated using WPI of Manufactured Products). We encounter different National Industrial Classification (NIC) codes during our study period (i.e., NIC-1998, NIC-2004, and NIC-2008).[10] To enable comparison across years, we harmonize the data to NIC 2008. Standard data cleaning procedures have been applied: we dropped closed units, non-manufacturing units, negative values for output and fixed capital, and missing values.

Studies have utilised this dataset to analyse various aspects of formal sector firms in India. These studies have largely examined how firms have responded to changes in labour market regulations (Ahsan and Pages, 2009), finance availability (Bhaumik et al, 2012), and infrastructural constraints (Allcott et al., 2016; Abeberese, 2017), among others. While much research has relied on cross-sectional data, longitudinal studies probing the role of institutions on firm growth are limited. Our study addresses some of these gaps using the ASI panel data.[11]

[5]Although, Assam belongs to the North Eastern region, it shares very similar demographic characteristics to other states within the mainland India in terms of area, population, size of the economy, etc. Hence, we include Assam in our analysis.

[6]Among the UTs, we include Delhi as it contributes significantly to the GDP of the country like any other state within the territory of India, and is thus, comparable to other states in the sample. However, we exclude the state of Goa as it is the smallest state in terms of size, and is hence, not comparable.

[7]Although, the panel data is available from 1999 onwards, we only use the data for the period 2001-2020. This is done to take into account the formation of new states such as Chhattisgarh (from Madhya Pradesh), Jharkhand (Bihar), and Uttarakhand (Uttar Pradesh) for which the data is available after the year 2000. Also, the ASI panel data does not provide us with the district identifiers which makes it difficult to identify the firms belonging to the newly formed states.

[8]Although, the ASI survey is conducted at the plant level, we use the terms 'firm' and 'plant' interchangeably as we focus on firms with a single-plant. This aligns with standard practice in the literature (See Dougherty, 2009). However, we lose less than 1 percent of observations in the process.

[9]Employment and Labour Productivity need not be deflated (Labour Productivity=Deflated GVA/Employment).

[10]NIC 1998 provides the classification of industries for the period 1998-2003; NIC 2004 for the period 2004-2007; and NIC 2008 for the period after 2008.

[11]The data for the dependent variables – fixed capital, employment, and labour productivity – are found to be normally distributed (the frequency distributions are presented in Figure 5 in the Appendix).

4.2 *Variables*

Measuring Firm Performance

Considering that the effect of bribery is likely to differ across firm outcomes (Zhou and Peng, 2012), we consider two firm performance measures in our study: sales growth and labour productivity growth.[12] Sales growth is calculated as the difference between the natural logarithm of real output sales for two time periods. Labour productivity is measured as sales divided by the number of full-time permanent workers. Nominal sales figures have been deflated using GDP deflators. From the ASI panel dataset, we consider growth in Fixed Capital, Gross Value Added (GVA) and labour productivity as indicators of firm performance.

Measuring Corruption

Our main explanatory variable is the corruption faced by private firms. The survey gathered information about the experience of firms with corruption, providing crucial data on informal payments made by firms. This monetary measure of corruption is more accurate in assessing its impact on firms compared to corruption perception indicators (O'Toole and Tarp, 2014). This variable is included in our model specification as a percentage of sales, ranging from 0 to 100. Specifically, firms were asked the following question:

"It is said that establishments are sometimes required to make gifts or informal payments to public officials to 'get things done' with regard to customs, taxes, licenses, regulations, services etc. On average, what percentage of total annual sales, or estimated total annual value, do establishments like this one pay in informal payments or gifts to public officials for this purpose?"[13]

Apart from corruption, we consider a group of variables as core explanatory variables, including firm-specific characteristics such as firm size, age, legal status, location, and investment in Research & Development (R&D). The age of the firm represents the number of years since the firm started its operations, and firm size is measured by the number of workers employed by the firm. We also include legal status, firm location, investment in R&D, and the share of skilled workers as firm-specific controls. The list of variables and their construction is presented in Table A1 in the Appendix.

[12]Alternative measures of firm performance enable us to gauge the performance in a granular way, and also avoid shortcomings associated with a single performance indicator.
[13]This variable is the main proxy for corruption in our study.

4.3 *Method*

Our main objective in this paper is to examine the interconnectedness between regulation, corruption, and firm performance. We proceed in two stages. First, we establish the negative impact of corruption on firm growth. This baseline analysis is conducted using both OLS and IV methods. Next, we show how regulation acts as a catalyst and leads to increased corruption that eventually hurts firms. This captures the mediating effects of regulation, which is executed through the staggered DiD technique.

We begin with an OLS estimation to assess the impact of corruption on firm performance. The model we use takes the following form:

$$FP_{j,i,s} = \beta_0 + \beta_1 Bribe_{j,i,s} + \sum \beta_n Firm_{j,i,s} + \theta_i + \alpha_i + \epsilon_{j,i,s} \qquad \text{---------- (1)}$$

where the subscripts j indicates the firm, i indicates the industry, and s indicates the state. The dependent variable FP stands for firm performance, which is proxied using annual growth in sales and labour productivity. Bribe is our main variable of interest, expressed as a percentage of total annual sales. Firm is a vector of variables capturing firm characteristics, namely size, age, legal status, location, and investment in R&D. We also include industry-fixed effects (θ_i) and state-fixed effects (α_s) to account for industry- and state-level characteristics that might influence our main results.

First, we estimate equation (1) for the total sample, and then for subsamples classified based on size and age of the firm. For size, the estimation is performed separately for small, medium, and large firms.[14] We perform an additional subsample analysis based on firm age by classifying firms into young and old, using the median age as the cut-off.[15] Before scrutinizing our growth variables, we carefully check for observations beyond the expected range. As these outliers are likely to bias the results, we exclude them using the three-standard-deviation rule. After applying these elimination criteria, we end up with 6393 firms.

4.4 *Endogeneity*

A major concern when estimating equation (1) using the OLS method is the endogeneity issue associated with the variable that proxy corruption. Endogeneity mainly stems from measurement errors in firms' bribe payments (actual bribe vs. reported bribe) and simultaneity

[14]Based on number of employees, the WBES categorizes firms into small (>=5 and <=19), medium (>=20 and <=99) and large (>=100). Due to very few samples of micro firms (less than 1%), we exclude them from our analysis.

[15]We rely on median age instead of mean age to do away with the influence of outliers. Unlike mean, the median is not affected by extreme values in the sample.

bias (reverse causality). Bribe payments by firms could be endogenous if corrupt bureaucrats target the most capable firms, or if firms rely on illegal payments to gain advantages over competitors (Svensson, 2003). Better performing firms are likely to relocate to regions with higher-quality institutions to escape dealing with weak institutions (Fernandes & Kraay, 2007). Further, better performing firms have a greater ability to pay bribes, which may increase the frequency of visits by government officials.

Without controlling for endogeneity, the estimation is likely to be biased (Ahlstrom *et al.,* 2010). We tackle this issue by employing an Instrumental Variable (IV) method. However, the lack of appropriate variables to instrument corruption is a serious issue plaguing studies that analyze corruption at the firm level (Kato and Sato, 2014). In this study, we consider two variables to instrument our bribery variable.

First, we use the industry-city average of bribe payments, as employed by Fisman and Svensson (2007) and Martin et al. (2020).[16] Second, we use the percentage of time spent by top management dealing with public officials in a month (Abudu, 2017; Chhetri and Raj, 2024). For this instrument as well, we construct the industry-city average. The 'industry-city' average depends on industry characteristics that are correlated with firm-level bribery but unrelated to firm-level unobservables that could be correlated with performance indicators.[17] Using 'industry-city' averages of bribe payments instead of bribe payments is justified (see Aterido *et al*., 2007).

However, the rationale for using senior managers' time as an instrument may require further justification. It is well known that with better institutions in place, firms tend to spend less time dealing with government regulations (Rodriguez-Pose and Zhang, 2020). Firms that share strong social ties with bureaucrats could spend more time interacting with them (Collins et al., 2009). Alternatively, the time spent by a firm with bureaucrats could reveal the degree of control bureaucrats exert on the firm (Svensson, 2003). In either case, we anticipate that the likelihood of bribery increases with the time firms spend with bureaucrats. However, there is no reason to believe that such interactions should directly affect firm performance. We believe these instrumental variables meet the exclusion criteria, as they would not directly affect firm performance beyond their indirect effect through the bribery variable.

[16]Studies by Aterido *et al.,* (2007) and Beltran (2016) have also employed such averages as an instrument to address the issue of endogeneity. For instance, Aterido *et al.,* (2007) used country-city-sector-year average in place of own values of investment climate variables as an instrument.
[17]This provides the justification for using industry-city averages as our instrument.

4.5. Staggered Differences-in-Difference: Amendments to the Industrial Disputes Act (1947)

We explore the role of regulations, specifically the amendments to the IDA, to assess how these regulatory changes interact with corruption and influence firm performance. To understand how regulation impacts firm performance through its interaction with corruption, we employ the staggered DiD method. This approach addresses the 'negative weighting problem' that can arise with multiple treatment years in conventional DiD methods (Sun and Abraham, 2020). We utilise the unique opportunity presented by the IDA amendments since 2014. By applying a staggered DiD identification strategy, we discern the effects of regulation on firm growth via the corruption channel. The amendments, varying across states and external to the firms, introduced an exogenous shock to the regulatory environment, thereby providing necessary variation to identify the causal effect of corruption. The staggered roll-out of these amendments across Indian states introduced natural variations in the regulatory environment. These variations, driven by policy decisions rather than firm-level characteristics, ensured that changes in regulatory thresholds were independent of firms' inherent attributes or growth trends. This exogeneity was vital for isolating the true causal impact of corruption.

Table 1 lists the states that implemented the amendment to the IDA (1947) and the respective years of implementation. With some states adopting the amendments earlier than others, the classical 2x2 Difference-in-Differences (DiD) model is insufficient due to the staggered nature of the amendment period. Therefore, we employ a modified DiD approach known as Staggered Differences-in-Differences. This method accounts for variations in the treatment period and provides robust, unbiased estimations (Callaway and Sant'Anna, 2021; Roth and Sant'Anna, 2021; Sun and Abraham, 2021).

Table 1: Amendments to the IDA, 1947(u/s 25 K of V-B)

States	**Year**
Rajasthan	2014
Andhra Pradesh	2015
Maharashtra	2015
Haryana	2016
Jharkhand	2017
Uttar Pradesh	2017

Source: V.V Giri National Labour Institute, NOIDA and Indian Institute of Public Administration, New Delhi (Ministry of Labour and Employment).

Our staggered DiD framework exploited this variation by comparing firms in states with flexible labour markets (treated) to those in states with more rigid labour markets (control). The treated group includes Rajasthan, Andhra Pradesh, Maharashtra, Haryana, Jharkhand, and Uttar Pradesh, while the remaining states serve as the control group. The first difference stems from comparing these groups, while the second difference is based on the timing of the IDA amendments, dividing the sample into pre- and post-treatment periods across states. This approach allows us to rigorously capture the effects of corruption and gain clear insights into its impact on firm growth.

The empirical specification for performing the staggered DiD is:

$$Y_{i,t} = \lambda_i + \alpha_t + \sum_{k=-m}^{-2} \beta_k \cdot D_{i,t}^k + \sum_{k=0}^{q} \beta_k \cdot D_{i,t}^k + \mu_{it} \quad \text{---------- (2)}$$

where

$$D_{i,t}^k = \mathbf{1}\{t - E_i = k\}$$

$Y_{i,t}$ is the outcome for unit i at time t;

λ_i is the unit fixed effects which controls for all time-invariant firm characteristics such as location, industry, management quality;

α_t is the time fixed effects which controls for common macroeconomic shocks affecting all firms in a given year;

E_i is the treatment adoption year, with t-E_i is the Event time, such that k=0 is treatment year, k=1 is one year after treatment, and k=-2 is two years before treatment);

β_k is the event-study coefficients; and μ_{it} is the error term.

The Pre-treatment effects is captured by $\sum_{k=-m}^{-2} \beta_k \cdot \mathbf{1}\{t - E_i = k\}$; and

Post-treatment effects is captured by $\sum_{k=0}^{q} \beta_k \cdot \mathbf{1}\{t - E_i = k\}$.

The staggered nature of the amendments creates a natural experiment setting. States adopting the amendments at different times allowed for comparing firm outcomes in treated versus untreated states, before and after the policy change. The increase in the worker threshold for IDA applicability changes regulatory oversight and administrative burdens, potentially reducing the need for firms with 100-300 workers to interact with public officials, and, therefore, reducing the chances of engaging in corrupt practices. This differential exposure to corruption pre- and post-amendment provides a clear context to assess its impact on firm growth.

Robustness Check

We perform a battery of robustness tests. First, we analyze firm-level corruption using ASI panel data, where corruption is proxied by *conviction rates*[18] under the Prevention of Corruption Act (PCA). The conviction rates (PCA) refer to the number of cases in which convictions were made as a percentage of the total number of cases tried in court in that year.[19] The Indian judiciary is plagued by several issues, such as high pendency rates, low conviction rates, and poor infrastructure (Sinha, 2019; India Justice Report, 2020; Amirapu, 2021). The sad reality is that the average conviction rates for corruption cases are much lower than those for Indian Penal Code (IPC) and Special and Local Laws (SLL) cases in India. According to a study by Jha and Shekhar (2019), in 2016, the average conviction rates for PCA cases were about 37 per cent compared to 65 per cent for IPC and SLL cases. They also show significant variation in IPC, SLL, and PCA cases across Indian states for 2016. However, our focus is solely on the conviction rates of cases under the PCA. Therefore, we present the average conviction rates for PCA cases across states for the period 2001-2020 (Appendix Figure 6).

Between 2001 and 2020, states such as Andhra Pradesh, Assam, and Bihar had mean conviction rates for corruption cases well above 60 per cent, while states like Himachal Pradesh and Jammu and Kashmir had conviction rates below 20 per cent. A higher conviction rate[20] under the PCA indicates that the state is more efficient in convicting cases related to corrupt activities. This can deter firms from engaging in corruption due to the higher chances of conviction. If we extend this argument logically, a higher probability of getting caught should reduce corruption (whether in incidence, magnitude, or both). On the contrary, lower conviction rates under the PCA would mean that corrupt cases have a lower incidence of getting convicted. This could create an environment of higher corruption, as firms or other economic entities are less concerned about being convicted for engaging in corruption. Thus, we argue that higher conviction rates under the PCA translate into higher probabilities of being caught, which eventually reduces the incidence of firm-level corruption, and consequently leads to better firm

[18]The Prevention of Corruption Act (PCA) in Indian law is aimed to fight corruption in the country's government agencies and public sector businesses. The act was passed by the Parliament of India to consolidate and amend existing laws on corruption prevention. The PCA establishes penalties for public servants and others involved in corrupt activities. Overtime, the PCA has witnessed several amendments: from the Criminal Law (Amendment) Ordinance of 1944 in the pre-independence era, to the PCA, 1947, and later to the PCA of 1988 in the post-independence era. More recently, the law was amended again (known as PCA, 2018) to address the inadequacies of previous versions of the Act and to align with international standards.

[19]Recently, Kato and Sato (2014, 2015) have used conviction rates to instrument corruption in the Indian context.

[20]This basically points to the presence of an effective judiciary, which can have a neutralizing effect on the inefficiencies caused by regulations, which creates opportunities for corruption within an economy.

performance. The crux of our argument is that higher conviction rates typically result in lower corruption, and hence, translate into better firm performance. Since conviction rates are aggregated at the state level, we conjecture that firms located in states with relatively higher conviction rates are positively affected than firms located in states with lower conviction rates. We use firm performance measures as the dependent variable and conviction rates as the main independent variable to analyze the relationship.

Second, we complement our findings on the impact of corruption using the WBES panel data (2022), which has recently become available. This data enables us to track the same firms over time. Firms are asked whether they consider corruption to be an obstacle. Firms whose perception of corruption improved between 2014 and 2022 (firms responding 'Yes' in 2014 but 'No' in 2022) form the treated group, while firms whose perception of corruption remained the same in 2014 and 2022 (firms responding 'Yes' in 2014 as well as in 2022, or 'No' in 2014 as well as in 2022) form the control group.[21] Any positive change in firms' responses (a firm responding 'Yes' in 2014 but 'No' in 2022) would signify that firms that once considered corruption to be an obstacle no longer see it as such. Such positive change would mean that corruption has reduced, as perception is directly influenced by what firms experience on the ground. Thus, as a robustness check, we test this hypothesis in this paper.

Third, we carry out a sub-sample analysis for equation (1) by age and size of the firm. The WBES classifies firms into small, medium and large categories, which we utilize to examine the impact of corruption across these firm sizes. Besides, we use the median age of the firms as the benchmark to divide the sample into young and old firms and examine the impact of corruption across firm age. These two sub-sample analyses help us gauge the relationship through the lens of size and age, which are two of the most prominent firm characteristics.

5. Results and Discussion

Our investigation into the impact of corruption on firm performance is structured systematically. We first examine the relationship between corruption and firm performance using OLS and IV methods to establish a clear understanding of the direct impact of corruption on firms. This baseline analysis enables us to estimate how corruption impacts firm outcomes independently of regulatory changes. Once this baseline is established, we introduce the role

[21] Firms whose perception deteriorated between 2014 and 2022 (firms responding 'No' in 2014 but 'Yes' in 2022) have been excluded as they cannot be categorised in either group (neither treated nor control). Besides, such observations are few and rare, and do not affect our results.

of regulations by focusing on the IDA amendments. By examining the effects of these regulatory changes through staggered DiD estimation, we assess how regulations interact with corruption to influence firm performance. We also conduct robustness tests to ensure the stability of our results. This approach helps us to isolate and understand the direct effects of corruption before analysing how regulatory changes exacerbate these effects. Such approach not only provides clarity but also aligns with Public Choice Theory, which emphasizes the role of regulatory factors in shaping economic outcomes.

5.1 *Summary Statistics*

The summary statistics for the variables considered in the estimation are presented in Table 2. Our working sample consists of 6393 firms (after applying the standard data cleaning procedures).

Table 2: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Sales growth	6393	0.09	0.64	-8.15	9.15
LP growth	6393	-2.42	6.15	-57.41	40
Bribe (%)	6393	0.17	1.19	0	40
Age	6393	21.12	14.27	1	99
Size	6393	1.91	0.73	1	3
Legal Status	6393	0.46	0.50	0	1
EPZ or IPs	6393	0.66	0.47	0	1
R & D	6393	0.35	0.48	0	1
Skilled Worker (share)	6393	0.52	0.24	0	1
Workers' Education	6393	9.53	2.33	0	20
Senior Manager's Time	6393	4.60	15.13	0	100

Source: World Bank Enterprise Survey (2014).

We observe that firms have experienced modest growth in sales (0.09 percent annually) but a decline in labour productivity (-2.5 percent annually).[22] This low productivity is mainly driven by the large concentration of firms in low productivity sectors (Kapoor, 2018). On average, about 17 percent of annual sales are paid as bribes. The sample firms have an average age of 21 years, with about 34 percent classified as small, 43 percent as medium-sized, and 23 percent

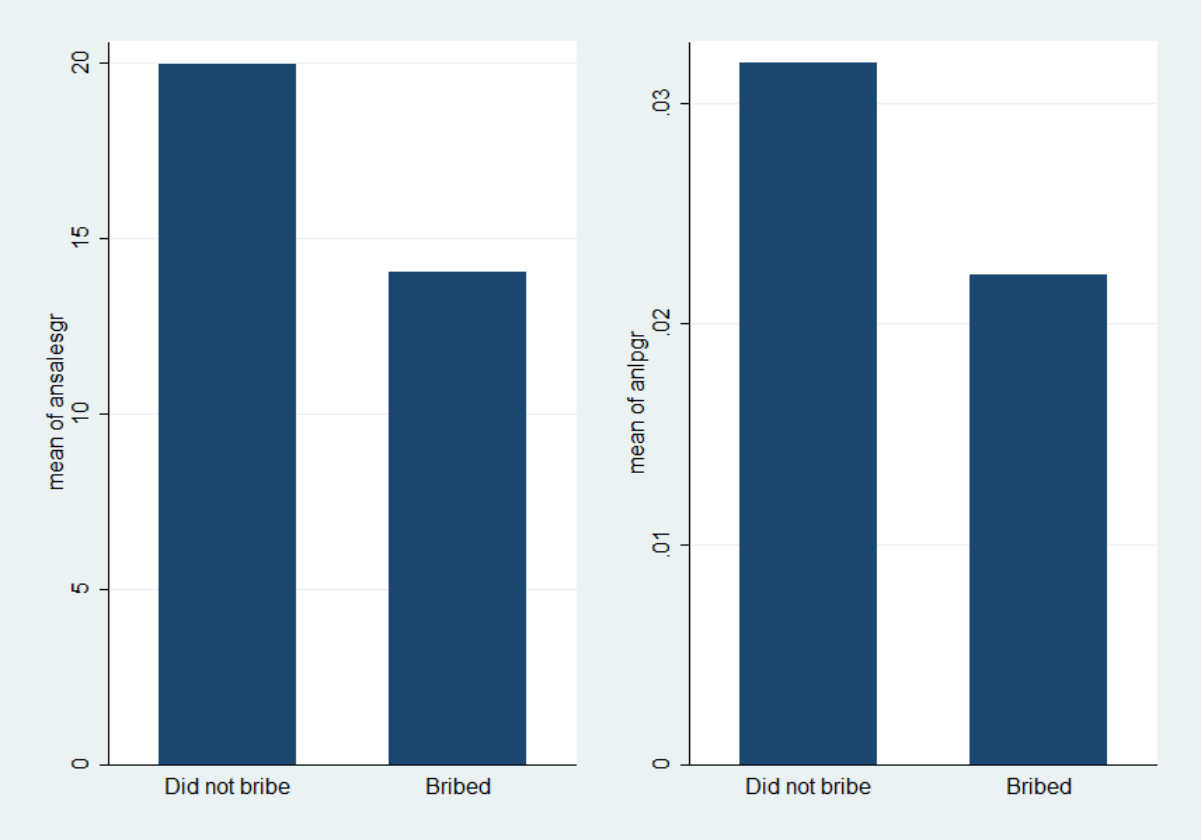
[22] One may note that the firms have to report their sales and employment for two time periods (present value and value 2 years ago). We use this information to calculate the respective growth rates.

as large. About 46 percent of firms are proprietorship firms, and more than two-thirds are located in export promotion zones or industrial parks. Only 35 percent invest in R&D. Given the positive link between R&D investment and productivity (Hall and Mairesse, 1995; Griliches, 2007; Bravo-Ortega and Marín, 2011; Hammar and Belarbi, 2021), the low R&D participation of Indian firms likely contributes to their low productivity performance. Senior managers spend an average of 4.5 hours per month dealing with public officials.

5.2 *Regression Results*

We begin by visualising the link between corruption and firm performance in Figure 1. We plot firm performance measures (average annual growth in sales and labour productivity) on the y-axis and corruption on the x-axis. Comparing bribing firms with non-bribing firms, we observe that bribing firms register lower growth in sales and labour productivity. This visual evidence suggests that corruption likely hampers firm growth in India. We next examine whether this observed relationship survives the scrutiny of econometric analysis.

Fig. 1 Relationship between bribery and firm performance



Source: World Bank Enterprise Survey (2014).

We first discuss the OLS and IV results presented in Table 3. OLS results are presented in columns (1) and (3), while IV results are in columns (2) and (4). OLS estimates suggest that

bribery negatively affects firm growth, whether measured by sales growth or labour productivity growth. Specifically, a 10 percentage point increase in bribe payments lowers sales growth by 0.01 percent and labour productivity growth by 1.6 percent. These findings align with previous studies by Fisman and Svensson (2007), Dutta and Sobel (2016) and Martins *et al*., (2020), which also concluded that bribery harms firm growth.

Table 3: Impact of bribery on firm performance (OLS and IV Results)

Variables	Sales Growth		Labour Productivity Growth	
	OLS (1)	IV (2)	OLS (3)	IV (4)
Bribe (%)	-0.001 (0.01)	-0.03 (0.02)*	-0.16 (0.06)**	-0.96 (0.21)***
Age	-0.01 (0.00)***	0.01 (0.00)***	0.04 (0.01)***	0.04 (0.01)***
Size Medium	0.05 (0.02)**	0.05 (0.02)**	-0.49 (0.18)***	-0.48 (0.18)***
Large	0.07 (0.02)***	0.07 (0.02)***	-1.18 (0.22)***	-1.22 (0.23)***
Legal Status	0.02 (0.02)	0.02 (0.02)	-0.59 (0.16)***	-0.57 (0.16)***
Export Promotion Zone	0.04 (0.02)**	0.04 (0.02)**	-0.57 (0.18)***	-0.64 (0.18)***
Research & Development	0.02 (0.02)	0.02 (0.02)	0.43 (0.17)**	0.38 (0.17)**
Skilled Workers	0.01 (0.04)	0.01 (0.04)	1.78 (0.34)***	1.79 (0.34)***
Worker's Education	-0.00 (0.00)	-0.00 (0.00)	0.09 (0.03)***	0.10 (0.03)***
Constant	0.03 (0.04)	-1.05 (0.45)**	-4.94 (0.46)***	-13.53 (4.35)***
No. of Observations	6393	6393	6393	6393

Source: Own estimates.
Notes: Standard errors are reported in the parenthesis.
***, **, and * shows significance level at 1%, 5%, and 10%, respectively.

We also account for the endogeneity of bribery by employing a standard instrumental variable (IV) procedure. We use 'industry-city' averages of bribe payments and the time spent by top management with bureaucrats as instruments. The results are reported in columns (2) and (4) of Table 3. Various test statistics (refer to Table A2 in the appendix) lend strong support for the use of instruments. Both instruments pass the test for weak instruments, suggesting that they are strongly correlated with bribery. Further, the Sargan test statistic confirms that the instrumental variables are exogenous and correctly excluded from the performance equation. The IV results are similar to OLS results, with slightly higher magnitudes of the coefficients.

To be precise, a 10 percentage point increase in bribe payments lowers sales growth by 0.3 percent and labour productivity growth by 9.6 percent. Our findings are robust to endogeneity concerns, and we can safely conclude that corruption hinders firm growth and performance in India. Consistent with both theoretical and cross-country evidence, corruption is found to 'sand the wheels of growth' for firms in India.

As our baseline analysis confirms that corruption negatively affects firm growth, we now turn to examining how regulation acts as a catalyst for increased corruption, focusing on IDA amendments. Our primary objective here is to assess how regulations interact with corruption to influence firm performance. We begin with descriptive evidence from the WBES dataset to explore the relationship between regulation, corruption, and firm performance, which allows us to identify initial patterns and correlations. We then proceed to rigorous econometric analysis to test whether these patterns hold under more stringent scrutiny.

5.3 *Labour Regulations and Corruption: Forging the Link*

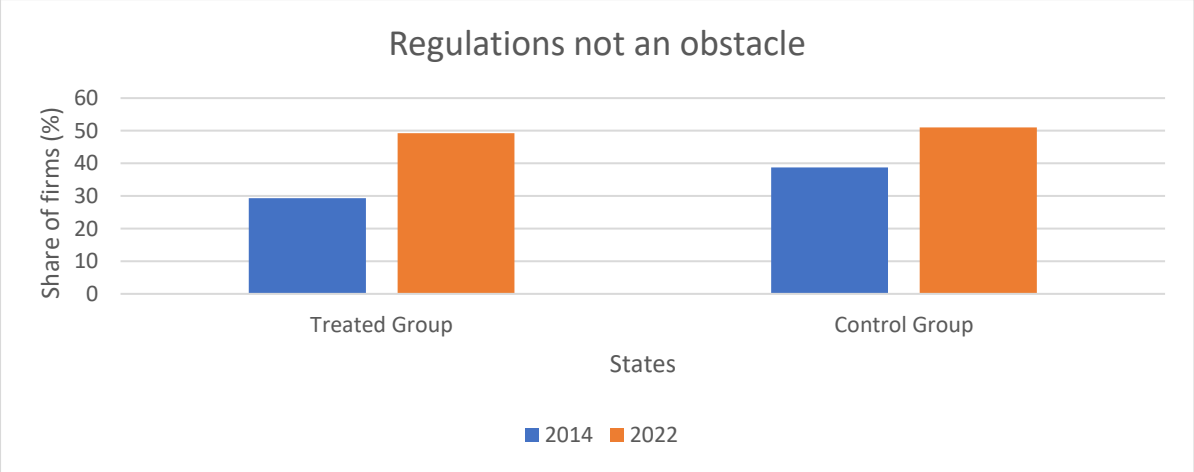
Much has been discussed about how cumbersome regulations are bypassed through bribery, particularly at the firm level, yet empirical evidence supporting this is scarce. The channel through which more regulations lead to more corruption (or vice-versa) seems to be proven only theoretically, particularly in the Indian context. However, the staggered amendments to the IDA across Indian states provide an opportunity to examine this relationship in real-world settings. The WBES includes panel data for India, covering firms before and after the enactment of the amendments, allowing us to explore the impact of these regulatory changes on both corruption and firm performance.

The WBES panel data survey includes several questions related to institutional dimensions, two of which are particularly relevant to our analysis. The first question addresses firms' perceptions of the challenges posed by labour regulations in their state. To be precise, firms were asked to what extent they consider labour regulations an obstacle[23] (scaled from 0 to 4, where 0 means no obstacle; 1 – minor obstacle; 2 - moderate obstacle; 3 - major obstacle; and 4 – very severe obstacle). The second question focuses on firms' bribery payments, asking what percentage of their total annual sales were paid as informal payments. By analyzing responses to these questions, we examine the relationship between regulatory burden and corruption, setting the stage for further analysis of how they interact with firm performance.

[23] To calculate the share of firms, we simply divide the number of firms that does not consider labour regulations as an obstacle in a state (coded as 0) by the total number of firms in that particular state.

Our argument is straightforward: states where amendments were enacted (treated group) should have experienced a greater easing of regulations compared to other states (control group). Consequently, we expect the share of firms not reporting labour regulations as an obstacle to increase in 2022 compared to 2014. As shown in Figure 2, the amendments in these states have indeed eased regulatory burdens, as seen from firms' responses before (2014) and after (2022) the amendments. The share of firms that no longer view labour regulations as an obstacle increased from 29.32 percent in 2014 to 49.28 percent in 2022 in the treated states. While there is also an increase in the share of firms not reporting labour regulations as an obstacle in control states during the same period, the magnitude of this increase is relatively higher in the treated states. This supports our claim that increasing the threshold from 100 to 300 workers (via the amendment under *Section 25 K of Chapter V-B*) helped firms in the treated states escape stringent regulations, leading to fewer firms reporting labour regulations as an obstacle in 2022.

Fig. 2 Labour Regulations not an obstacle (share of firms)

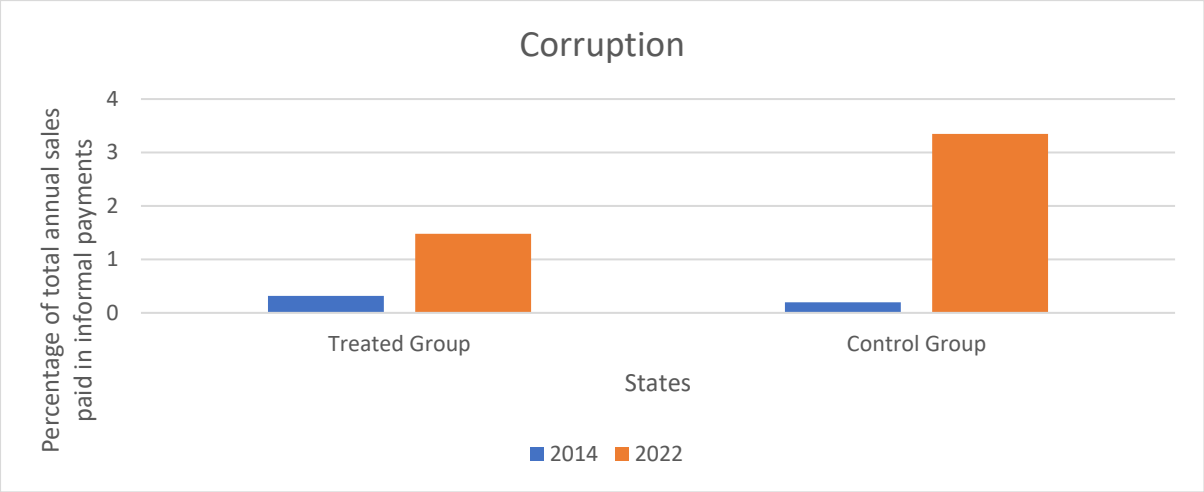


Source: World Bank Enterprise Survey Panel Data (2022).
Note: Treated Group includes the states that amended the IDA namely Rajasthan, Andhra Pradesh, Maharashtra, Haryana, Jharkhand, and Uttar Pradesh; and Control Group includes the remaining states.

Next, we compare the magnitude of bribery in the treated states with that in the control states, as shown in Figure 3. We expect that a reduction in regulatory burden should be followed by a fall in corruption levels. Our aim is to link lower regulatory burden with lower corruption through reduced interaction with public officials (Amirapu and Gechter, 2020). To achieve this, we compare the average percentage of total annual sales paid as informal payments by firms in the treated states with those in the control states, before and after the amendments. Although, firms report an increase in the percentage of total annual sales paid as informal payments between 2014 and 2022, the magnitude of bribery is much lower in the treated states compared

to the control states. We anticipate that the smaller increase in bribery in the treated states could be due to less exposure of firms to corrupt officials. In a counterfactual scenario, we would expect the magnitude of bribery to be equal (if not less) in the treated and control states. Thus, we establish a direct association between regulatory burden and corruption, though not causal in nature. Our descriptive analysis shows a clear link between regulatory burden and corruption. We will next subject this relationship to empirical scrutiny using rigorous econometric analysis.

Fig. 3 Percentage of total annual sales paid in informal payments (mean)



Source: World Bank Enterprise Survey Panel data (2022).
Note: Treated Group includes the states that amended the IDA namely Rajasthan, Andhra Pradesh, Maharashtra, Haryana, Jharkhand, and Uttar Pradesh; and Control Group includes the remaining states.

5.4 *Staggered Differences-in-Difference Results*

The Staggered DiD technique has gained prominence in recent years for establishing causality. Our staggered DiD design exploits the spatial and temporal variation in the amendments to the IDA to discern the effects of these changes on firm growth, measured by growth in fixed capital, employment, and labour productivity. Table 4 reports the average treatment effect of the IDA amendments on firm growth, using the Staggered DiD design, following Callaway and Sant'Anna (CS, 2020) and Roth and Sant'Anna (RS, 2021). The 'Term' in the first column denotes the period of implementation of the amendment to the IDA (1947). For example, a term value of 0 indicates the year of implementation, 1 signifies the first year after implementation, and so on. Similarly, negative values for 'Term' represent the years before the implementation of the amendment; for example, -1 signifies the year preceding the

implementation, -2 signifies two years before implementation, and so forth. Our focus is on Term > 0, which reflects the impact on firm performance after the amendments.

Table 4 shows the average treatment effects of IDA amendments on firms located in the treated states. We estimate the ATEs using two models: CS (2020) and RS (2021), as shown in Table 4. The event study row depicts the average treatment effects before and after the amendments. The results show positive and significant coefficients post-treatment (Term > 0, shown in the bottom half of Table 4), across both models, suggesting that firms in states that amended the IDA experienced higher growth in fixed capital, employment, and labour productivity compared to those in control states. The CS model suggests that IDA amendments resulted in a 3 per cent, 2 per cent, and 2 per cent increase in growth in fixed capital, gross value added, and labour productivity, respectively in the first year of the amendment; 5 per cent, 3 per cent, and 4 per cent higher growth in the second year; and 6 per cent, 4 per cent, and 9 per cent higher growth in the third year, and so on.[24] Similarly, the RS model suggests that IDA amendments led to a 4 per cent, 3 per cent, and 8 per cent increase in the first year; 7 per cent, 3 per cent, and 9 per cent in the second year; and 8 per cent, 5 per cent, and 15 per cent in the third year, and so forth. Both models yield positive ATE values, suggesting that proactive reforms reducing corruption yield significant economic benefits.

Equally interesting is the observation that the magnitude of these effects grows over time, indicating that firm performance continued to improve as more time passed after the amendments. Figure 4 (panels a, b, and c) visually presents the staggered DiD estimations. Each plot in the figure shows the point estimates from the pre-treatment year through post-treatment year (Butts and Gardner, 2022). The plots are the mirror image of the results in Table 4. Positive spikes in firm performance are clearly visible post-treatment, which clearly demonstrates that firms in states that amended the Act experienced better performance than firms in other states.

[24] One must note that for labour productivity, the ATE is found to be positively significant two years after the amendment took place.

Table 4: Staggered DiD Results (Amendment to the IDA, 1947)

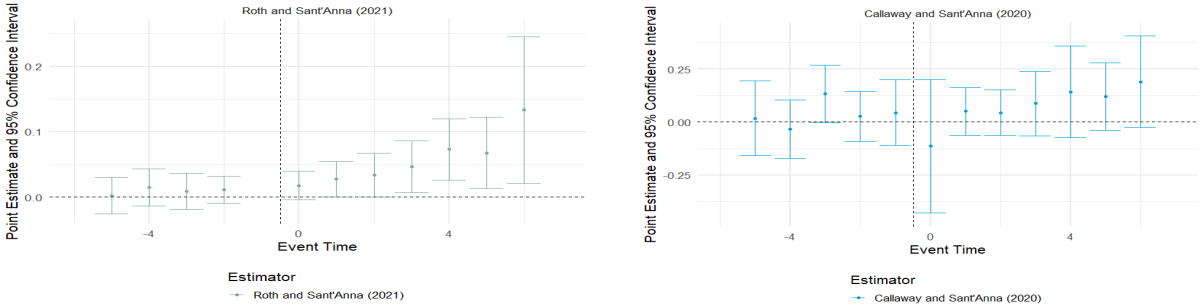
Term	Growth in Fixed Capital				Growth in Employment				Growth in Labour Productivity			
	CS (2020)		RS (2021)		CS (2020)		RS (2021)		CS (2020)		RS (2021)	
	ATE	S.E	ATE	S.E	ATE	S.E	ATE	S.E	ATE	S.E	ATE	S.E
-5	-0.02	0.02	0.06	0.06	0.05*	0.03	0.00	0.01	0.02	0.09	-0.11	0.09
-4	0.00	0.02	0.05	0.04	0.02	0.02	0.01	0.01	-0.03	0.06	-0.09	0.07
-3	-0.03	0.02	0.02	0.02	0.00	0.01	0.01	0.01	0.04	0.08	-0.02	0.07
-2	0.00	0.02	0.02	0.02	0.00	0.01	0.01	0.01	0.03	0.07	-0.03	0.07
-1	-0.03	0.02	-	-	0.00	0.01	-	-	0.04	0.08	-	-
0	**0.01**	**0.02**	**0.02**	**0.02**	**0.01**	**0.01**	**0.02***	**0.01**	**-0.11**	**0.16**	**-0.06****	**0.03**
1	**0.03***	**0.02**	**0.04****	**0.02**	**0.02****	**0.01**	**0.03*****	**0.01**	**0.05**	**0.05**	**0.08***	**0.05**
2	**0.05***	**0.03**	**0.07****	**0.03**	**0.03***	**0.02**	**0.03****	**0.02**	**0.04**	**0.06**	**0.09****	**0.04**
3	**0.06****	**0.03**	**0.08****	**0.03**	**0.04****	**0.02**	**0.05****	**0.02**	**0.09***	**0.07**	**0.15****	**0.06**
4	**0.02**	**0.04**	**0.05**	**0.04**	**0.06****	**0.03**	**0.07*****	**0.02**	**0.14***	**0.11**	**0.21*****	**0.07**
5	**0.05**	**0.05**	**0.08***	**0.05**	**0.05***	**0.03**	**0.07****	**0.03**	**0.12***	**0.08**	**0.15*****	**0.05**
6	**0.01**	**0.10**	**-0.01**	**0.09**	**0.12****	**0.06**	**0.13****	**0.06**	**0.19***	**0.11**	**0.28*****	**0.09**

Source: Own estimates.

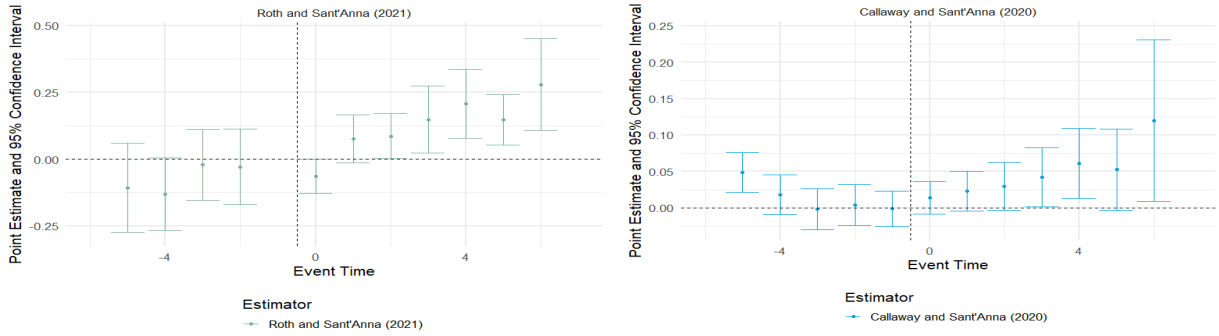
Note: ATE stands for Average Treatment Effect. S.E. stands for standard error.

Fig. 4 Staggered Differences in-Difference (visual presentation)

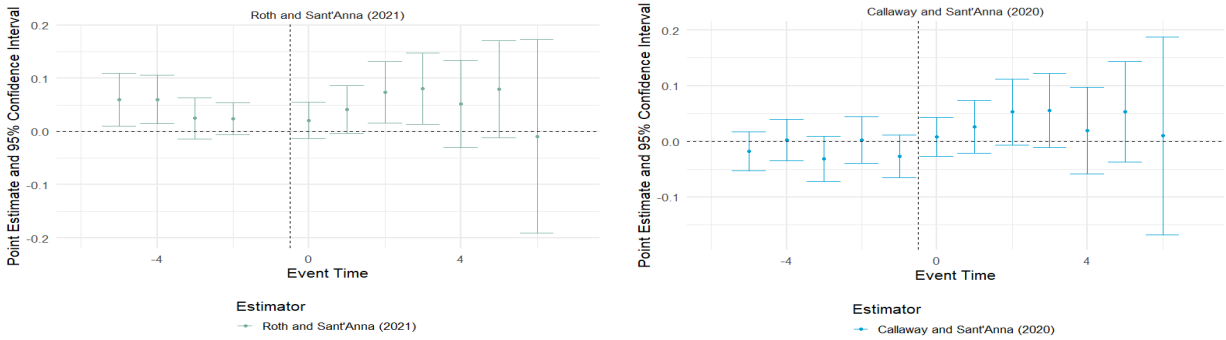
a) Event Study Plots: Impact of IDA Amendment on Fixed Capital



b) Event Study Plots: Impact of IDA Amendment on Employment



c) Event Study Plots: Impact of IDA Amendment on Labour Productivity



6. Robustness Tests

We conduct a range of robustness tests to ensure that our key findings are not driven by data deficiencies, modeling assumptions, or endogeneity issues. Due to space constraints, we discuss the results briefly and present detailed tables in the appendix.

First, we probe the link between corruption and firm performance using the Annual Survey of Industries (ASI) firm-level panel dataset from 2001 to 2020, where corruption is proxied by *conviction rates* under the Prevention of Corruption Act (PCA). The fixed effects panel regression results are presented in Table A3 in the Appendix. Consistent with our expectations, the coefficient associated with the conviction rate is positive and statistically significant across all three specifications. This implies that higher PCA conviction rates are positively correlated with growth in fixed capital, gross value added, and labour productivity, suggesting that firms located in states with higher conviction rates tend to experience higher growth. The basic message from the fixed effects panel regression analysis is that when corrupt cases are dealt through higher conviction rates, it can result in better firm performance. This reinforces our belief that the baseline results are reliable.

In the second robustness test, we employ the PSM technique using panel data on Indian firms released recently by the WBES. This panel data, covering the period from 2014 to 2022, enables us to compare firms' perceptions of corruption over time. Firms whose perception of corruption improved from 'Yes' in 2014 to 'No' in 2022 are classified as the 'treated group', while others serve as the 'control group.' We present the PSM results in Table A4 in the Appendix. As expected, the ATT is found to be positively significant. In other words, firms whose perception of corruption improved between 2014 and 2022 tend to show higher growth in productivity. PSM analysis reveals that firms in the treated group exhibit higher growth in sales and labour productivity, thereby reinforcing our claim that reduced corruption enhances firm performance.

As a third robustness test, we conducted sub-sample analyses using two setups to check the consistency of the findings from the full sample. The first sub-sample analysis examines the robustness of baseline results across different firm size categories. For this, we follow the WBES classification and divide the sample into small (5-19 employees), medium (20-99 employees) and large (100 or more employees) categories. The results are presented in Table A5 in the Appendix. We find that corruption has a significantly negative impact on medium- and large-sized firms,

while the effect is not significant for small firms. This possibly suggests that larger firms are more likely to be targeted by corrupt officials due to their visibility and perceived ability to pay, as argued in the literature (Svensson, 2003). The second sub-sample analysis involves categorizing firms based on firm age. Using the median age as the cut-off, we classify the sample into young and old firms. The results are presented in Table A6 in the Appendix Barring a few specifications, we consistently find a negative and significant coefficient for the bribery variable, thereby solidifying our stance that corruption adversely affects firm performance.

Thus, the robustness tests provide no evidence contradicting our baseline estimations, strengthening our confidence in these results. Our findings that corruption is harmful to firm growth and that curbing corruption leads to better performance are consistent with previous studies in the Indian context.

7. Conclusion

The question of whether corruption 'sands' or 'greases' the wheels of growth has been extensively studied. With mixed evidence, it becomes difficult to prescribe effective policies to address its menace. In this study, we employ a novel approach to disentangle the relationship between regulation, corruption and firm growth. While the WBES dataset has been previously utilized for this purpose, the ASI panel dataset has not yet been exploited. The use of panel data for a longer period makes this study unique and provides it with an edge over previous studies by covering recent years, particularly in the Indian context. Further, utilizing 'easing of regulations' as a proxy for firm-level corruption is a unique way to portray the dynamics related to the monopoly exercised by public officials and their natural power to extract bribes from firms. This paper investigates whether corruption impedes or promotes firm growth in India. Our analysis, based on rigorous econometric methods and comprehensive data, shows that bribery is widespread and significantly detrimental to firm growth. Around 26 percent of Indian firms engage in bribery, and they pay bribes amounting to around 17 percent of their annual sales. Our findings indicate that a 10 percent increase in bribery reduces sales growth by 0.3 percent and labour productivity growth by 9.6 percent. The negative impact is more pronounced on labour productivity growth than on sales growth.

Moreover, the impact of IDA amendments on firm performance is visualized through the channel of reduced corruption, adding to the thin literature on the effects of regulatory burdens in

developing countries. Using the WBES panel dataset, we uncover a clear link between regulations and corruption. We show that easing regulatory burdens is associated with lower corruption. Our analysis of amendments to the Industrial Disputes Act (IDA) reveals that firms in states that introduced IDA amendments experienced higher growth in fixed capital, employment, and labour productivity compared to firms in states that did not amend the Act. The staggered DiD results show a consistent improvement in firm performance following the IDA amendments. Further, we find that firm performance continued to improve as more time passed since the IDA amendments were implemented. This suggests that states proactive in introducing reforms aimed at reducing corruption benefitted more from such initiatives.

Our robustness tests further validate these findings. The fixed effects panel regression estimates show that higher conviction rates under the Prevention of Corruption Act correlate with higher growth in fixed capital, gross value added, and labour productivity. We also find that firms whose perception of corruption improved between 2014 and 2022 tend to register higher growth in productivity. Thus, corruption, whether measured by conviction rates or changing perceptions of firms, consistently shows a detrimental effect on firm growth. Our study rejects the 'efficient grease' hypothesis and finds that bribery does not promote productivity improvements but rather hampers firm growth. This study can be viewed as one more nail in the coffin affirming the ill-effects of corruption.

From a policy standpoint, this study makes several important suggestions. First, addressing corruption is crucial for businesses to thrive and grow, especially in developing countries like India, as it acts as a drag on firm productivity. Second, controlling corruption can be achieved, to a certain extent, by constraining the monopoly powers of public officials. Labour laws that encourage firm inspections create opportunities for corruption, so relaxing these laws can help firms escape the 'grabbing hands' of inspectors and thus be beneficial. Lastly, it is essential to incentivize and encourage states to implement reforms that ease regulatory burdens and curb the influence of public inspectors, thereby promoting a more favourable business environment.

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Appendices

Table A1: Construction of Variables

Sl. No.	Variable Name	Definition	Expected Sign
	Dependent Variable		
1.	Sales Growth	It measures the average annual growth in firm's sales (sales log transformed)	
2.	Labour Productivity Growth	It measures the average annual growth in firm's labour productivity (where LP=Sales/Employment)	
	Independent Variable		
3.	Bribe Percentage	Bribe as a percentage of sales	Negative
4.	Age	Binary variable; Young=1 (<7 years) Old=2 (>=7 years)	Ambiguous
5.	Size	Ordered variable; Small=1 (employing >=5 and <=19 workers) Medium=2 (employing >=20 and <=99 workers) Large=3 (employing>= 100 workers)	Ambiguous
6.	Legal Status	Binary variable; Proprietorship=1, and 0 otherwise	Ambiguous
7.	EPZ or IP	Binary variable; Firm located in Export Promotion Zone or Industrial Park =1, and 0 otherwise	Positive
8.	R&D	Binary variable; Firm investing in R&D=1, and 0 otherwise	Positive
9.	Share of Skilled Workers	It measures the ratio of skilled workers to total permanent workers	Positive
10.	Senior Manager's Time	Number of hours spent by firm management with public officials in a typical month	Positive

Source: Authors' construction based on WBES (2014).

Table A2: Tests for Endogeneity

Presence of Endogeneity (Durbin-Wu-Hausman test)	
Chi^2	1.256
F	(1.25)
Coefficient Value of Instrument	
Average_bribe_payment	1.082***
	(0.04)
Average_seniormanager_time	0.000
	(0.00)
Under identification test	
Anderson canon. Corr. LM statistic	673.78
(Chi^2 P-value)	(0.00)
Weak identification test	
Cragg-Donald Wald F statistic	363.92
Stock-Yogo weak ID test	(19.93)
Over identification test of all instruments	
Sargan statistic	0.433
(Chi^2 P-value)	(0.51)

Source: Authors' estimates.
Notes: Figures in the parenthesis indicate robust standard errors.
***, ** and * indicates the level of significance at 1%, 5% and 10% respectively.

Table A3: Fixed Effects Panel Regression Results

Variables	Fixed Capital	Gross Value Added	Labour Productivity
Conviction Rates (PCA)	0.0003 (0.00)***	0.0005 (0.00)***	0.0005 (0.00)***
Age	-0.00 (0.00)***	0.00 (0.00)*	0.00 (0.00)
Size	0.00 (0.00)***	0.00 (0.00)***	-0.00 (0.00)***
Sector	0.01 (0.05)*	0.03 (0.01)***	0.01 (0.00)**
Organisation type	0.04 (0.00)***	0.06 (0.00)***	0.03 (0.00)***
GER	-0.00 (0.00)***	-0.00 (0.00)***	0.00 (0.00)***
GSDP (Log)	0.18 (0.01)***	0.29 (0.01)***	0.30 (0.00)***
Road Density (Log)	0.13 (0.01)***	0.13 (0.01)***	0.02 (0.01)***
Constant	8.90 (0.08)***	6.96 (0.09)***	2.32 0.06)***
No. of Observations	605661	553360	553360
Number of Groups	172074	167049	167049
F Test	14.27***	6.93***	6.37***

Source: Own estimates.
Notes: Standard errors are reported in the parenthesis.
***, **, and * shows significance level at 1%, 5%, and 10%, respectively.

Table A4: Propensity Score Matching Estimation Results (with covariates)

Outcome variable	Sales Growth	LP Growth
1 vs 0	0.34 (0.12)***	0.65 (0.27)**

Source: Own Estimates.
Notes: Standard errors are reported in the parenthesis.
***, **, and * shows significance level at 1%, 5%, and 10%, respectively.

Table A5: By Size (OLS and IV Methods)

Variables	Small Firms				Medium Firms				Large Firms			
	Sales Growth		LP Growth		Sales Growth		LP Growth		Sales Growth		LP Growth	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Bribe	-0.010 (0.010)	-0.005 (0.041)	-0.078 (0.077)	-0.189 (0.305)	-0.077*** (0.015)	-0.074 (0.046)	-0.301*** (0.082)	-0.647** (0.254)	-0.087*** (0.019)	-0.298*** (0.078)	-0.126 (0.141)	-0.774 (0.557)
Age	-0.003 (0.002)	-0.003 (0.002)	0.057*** (0.013)	0.058*** (0.013)	-0.002 (0.002)	-0.002 (0.002)	0.041*** (0.009)	0.041*** (0.009)	-0.004*** (0.001)	-0.004*** (0.002)	0.044*** (0.011)	0.044*** (0.011)
Ownership	-0.041 (0.049)	-0.041 (0.048)	-0.388 (0.361)	-0.394 (0.359)	0.137*** (0.045)	0.138*** (0.045)	-0.322 (0.250)	-0.329 (0.249)	0.080 (0.054)	0.088 (0.055)	-0.211 (0.395)	-0.186 (0.394)
EPZ or IP	0.024 (0.053)	0.024 (0.052)	-0.204 (0.391)	-0.204 (0.388)	-0.023 (0.052)	-0.023 (0.052)	-0.659** (0.286)	-0.655** (0.285)	0.026 (0.057)	-0.002 (0.059)	-0.810* (0.415)	-0.896** (0.419)
R & D	-0.014 (0.057)	-0.013 (0.057)	0.202 (0.425)	0.194 (0.422)	0.090* (0.050)	0.090* (0.050)	0.452* (0.275)	0.438 (0.274)	0.068 (0.050)	0.086* (0.051)	0.687* (0.361)	0.740** (0.362)
Share of Skilled Workers	-0.027 (0.097)	-0.025 (0.097)	0.598 (0.721)	0.560 (0.724)	-0.004 (0.098)	-0.004 (0.098)	1.719*** (0.542)	1.695*** (0.540)	-0.022 (0.104)	-0.005 (0.107)	2.289*** (0.759)	2.343*** (0.757)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	-3.051 (4.028)	-3.066 (4.000)	39.501 (29.955)	39.853 29.757)	-0.819 (3.322)	0.833 (3.308)	-16.418 (5.205)	-14.834 (18.298)	-3.105 (3.664)	-3.266 (3.741)	-42.234 (26.681)	-42.728 (26.568)
R-Squared	0.044	0.044	0.038	0.038	0.056	0.056	0.041	0.036	0.078	0.020	0.064	0.053
Observations	2890	2890	2890	2890	3667	3667	3667	3667	1929	1929	1929	1929

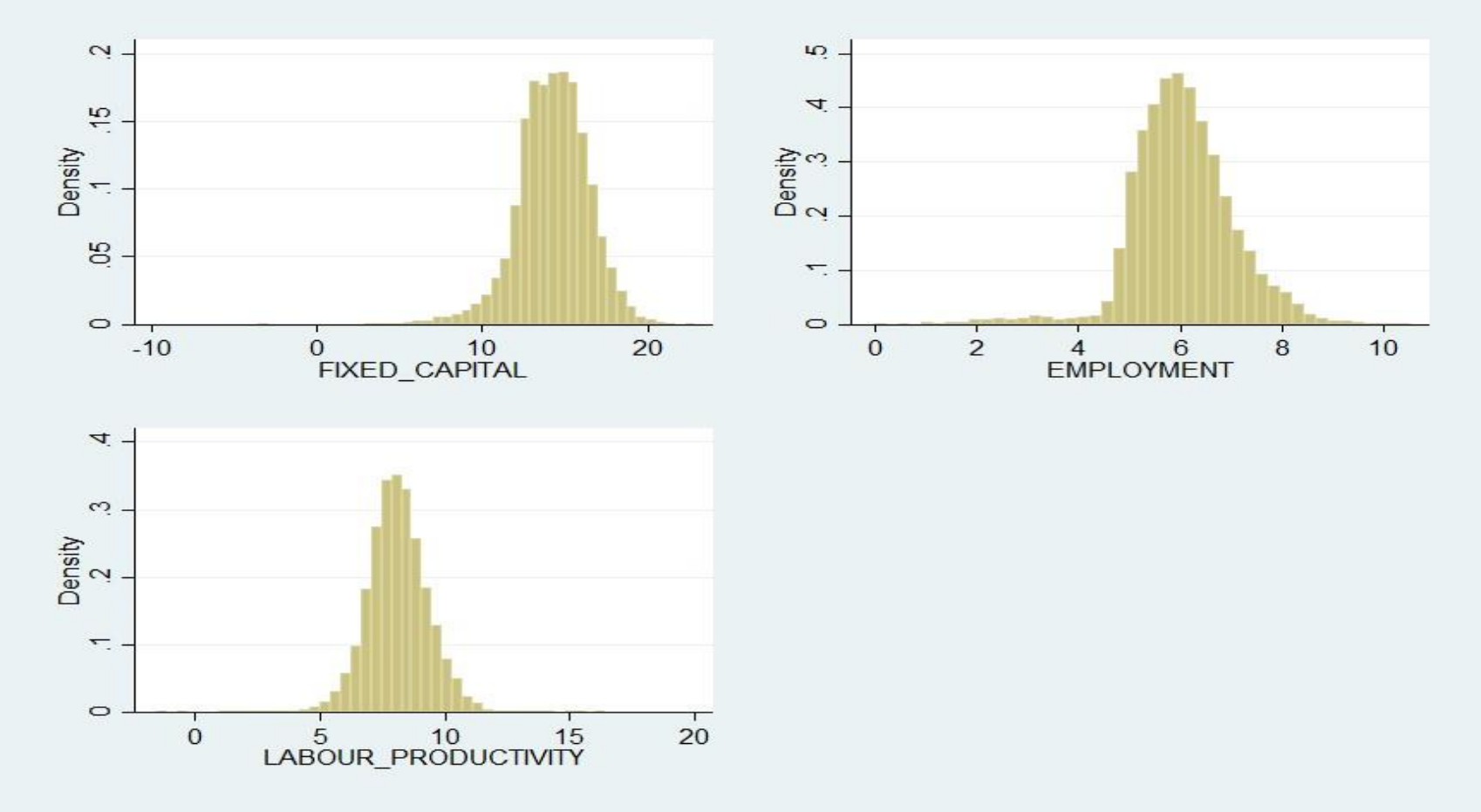
Source: Authors' estimates.
Notes: Figures in the parenthesis indicate robust standard errors.
***, ** and * indicates the level of significance at 1%, 5% and 10% respectively.

Table A6: By Age (OLS and IV Methods)

Variables	Young Firms				Old Firms			
	Sales Growth		LP Growth		Sales Growth		LP Growth	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Bribe	-0.100***	-0.076*	-0.174**	-0.077	-0.000	-0.049	-0.091	-0.725***
	(0.011)	(0.043)	(0.078)	(0.298)	(0.011)	(0.036)	(0.066)	(0.221)
Size								
Medium	0.042	0.040	-0.141	-0.152	-0.021	-0.021	-0.662**	-0.664**
	(0.043)	(0.043)	(0.297)	(0.297)	(0.046)	(0.046)	(0.275)	(0.277)
Large	0.120**	0.121**	-1.420***	-1.418***	0.038	0.031	-1.462***	-1.556***
	(0.055)	(0.055)	(0.382)	(0.381)	(0.056)	(0.056)	(0.335)	(0.338)
Ownership	0.024	0.024	-0.187	-0.185	0.084**	0.081*	-0.397	-0.440*
	(0.039)	(0.039)	(0.270)	(0.269)	(0.042)	(0.042)	(0.253)	(0.255)
EPZ or IP	-0.038	-0.038	-0.327	-0.329	0.073	0.068	-0.947***	-1.010***
	(0.044)	(0.043)	(0.303)	(0.302)	(0.045)	(0.045)	(0.272)	(0.275)
R & D	0.059	0.060	0.937***	0.942***	0.029	0.029	-0.057	-0.053
	(0.043)	(0.043)	(0.298)	(0.297)	(0.044)	(0.044)	(0.266)	(0.268)
Share of Skilled Workers	-0.048	-0.050	1.514***	1.505***	0.078	0.063	1.180**	0.981**
	(0.082)	(0.081)	(0.567)	(0.565)	(0.086)	(0.086)	(0.516)	(0.523)
Rule of Law	0.074	0.073	0.305	0.302	0.035	0.032	-0.183	-0.212
	(0.062)	(0.062)	(0.430)	(0.428)	(0.048)	(0.048)	(0.290)	(0.292)
Ease of Doing Business	-0.017***	-0.016***	-0.022	-0.022	-0.012***	-0.013***	-0.030	-0.032
	(0.005)	(0.005)	(0.033)	(0.033)	(0.004)	(0.004)	(0.024)	(0.024)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES
State Dummy	YES	YES	YES	YES	YES	YES	YES	YES
Constant	-2.993	-2.973	-22.104	-22.023	-1.579	-1.430	12.642	14.566
	(3.982)	(3.963)	(27.669)	(27.530)	(3.089)	(3.082)	(18.581)	(18.700)
R-Squared	0.047	0.046	0.026	0.025	0.021	0.017	0.033	0.012
Observations	4200	4200	4200	4200	4286	4286	4286	4286

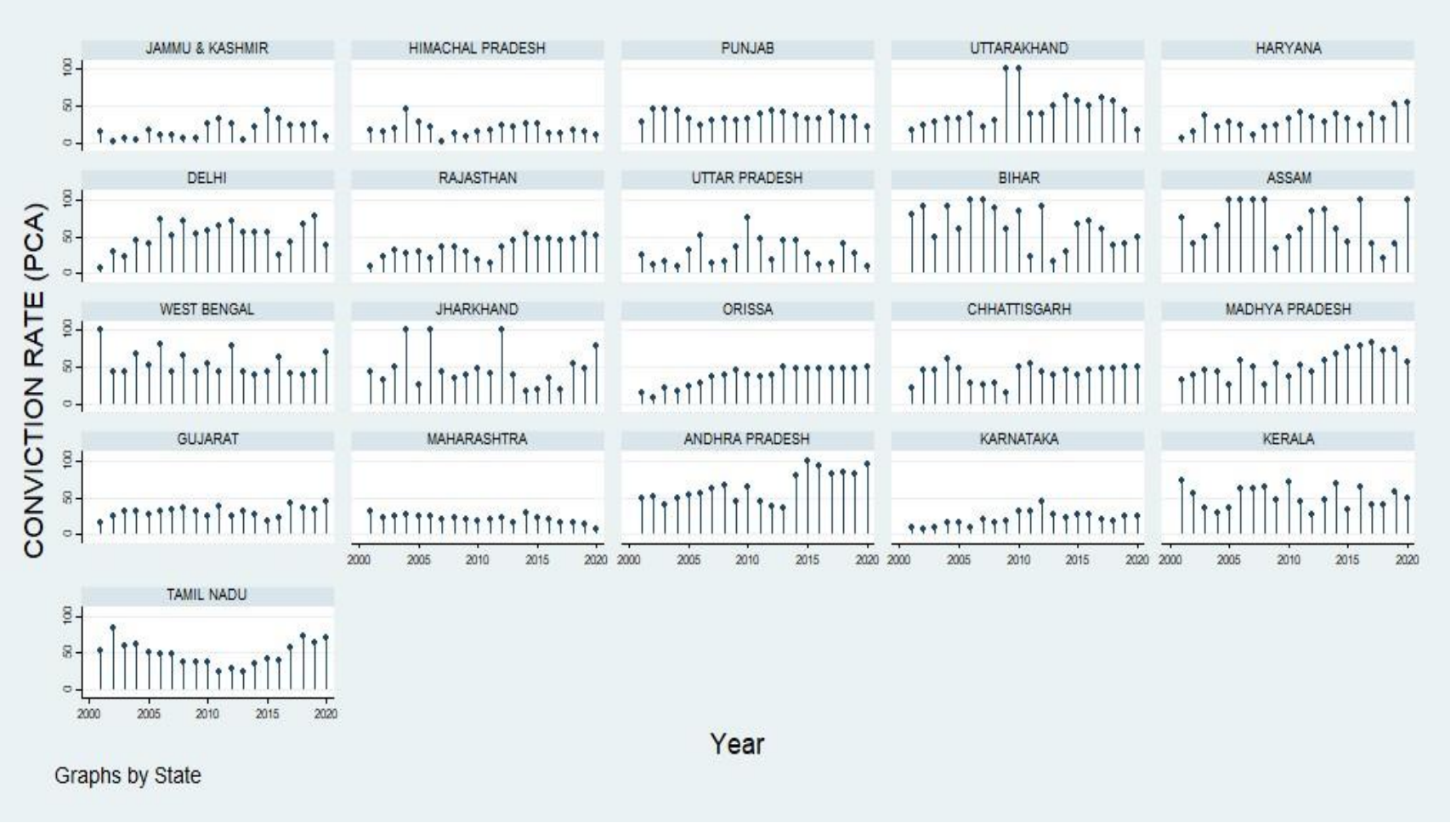
Source: Authors' estimates.
Notes: Figures in the parenthesis indicate robust standard errors.
***, ** and * indicates the level of significance at 1%, 5% and 10% respectively.

Fig. 5 Frequency Distribution (Balanced Panel)



Source: Annual Survey of Industries Panel Data (2001-2020).

Fig. 6 State-level variations in the average conviction rates of corruption cases under the PCA (2001-2020)



Source: National Crime Records Bureau.