Foreign Institutional Investors, Corporate Innovation and Corporate Social Responsibility

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Abstract

We examine the effect of foreign institutional investors (FIO) on the choices of emerging market firms. We focus on a sample of Indian firms close to the threshold of qualifying criteria of the 2013 mandatory CSR regulation. We show that firms with high FIO increase R&D expenses to reduce pre-tax profits and avoid the corporate social responsibility (CSR) law. The increased R&D expenses lead to increased innovation outputs of high FIO firms. We also identify FIOs' voting on shareholder proposals as the potential mechanism underlying the effect on R&D. We show that FIOs prefer long-term profitability through innovation over corporate sustainability.

1. Introduction

Foreign capital is an important driver of economic growth in emerging markets (Prasad, Rajan and Subramanian, 2007). A significant fraction of foreign capital in the emerging market is injected through foreign institutional investors. There is a long-standing debate on the effect of foreign institutional investment on emerging market firms. One school of thought is that foreign institutional investors can improve the quality of corporate governance and disclosure practices (Tsang, Xie, and Xin, 2019; An et al., 2021). The other view is that foreign institutions do not automatically improve corporate outcomes in emerging markets (Frenkel and Menkoff, 2004). These investors sort into already profitable firms (Agarwal et al., 2005). FIOs reduce information asymmetry using non-financial information such as CSR (Marshall et al., 2022).

One limitation of the current literature is that it focuses on the partial effects of FIO portfolio choices in emerging market companies. For example, FIOs also improve emerging market firms' innovativeness and sustainability practices (Dyck et al., 2019; Luong et al., 2017). While innovation can improve investee firms' long-term profitability, CSR's impact on profitability is unclear. However, how FIOs affect corporate outcomes when sustainability expenses crowd out corporate innovation expenses is less clear.

How do FIOs make investment choices when sustainability expenses crowd out innovation expenses? In this paper, we focus on the investment preference of FIOs in emerging market firms using the Indian CSR Regulation 2013. This law, henceforth S-135, made it mandatory for Indian firms above certain profit thresholds, turnover, and net worth to spend 2% of their pre-tax profits from the three preceding fiscal years on CSR projects. This regulation allows us to examine FIOs' preferences when these added expenses crowd out productive expenses such as innovation (Gangopadhyay and Homroy, 2022).

Using a sample of large listed Indian firms, we focus on firms' investment decisions near the threshold of being affected by the CSR law. Specifically, we examine if firms with high FIO in the narrow bandwidth just below the pre-tax profit qualification engage in real earnings management to avoid qualification. The high density of firms just below the pre-tax profit threshold of ₹50 million is only present in the post-regulation period. In the pre-regulation period, no bunching was observed at the threshold of pre-tax profit (₹50 million). We show that firms with high FIO in the *Bandwidth* are more likely to increase R&D expenses to avoid S-135 relative to firms with low FIO. We find similar results for FIOs from high-CSR countries (the United States, UK, EU, Canada and Australia) and low-CSR countries. This result implies

that when faced with a tradeoff between CSR and R&D, firms with high FIO chose to increase R&D expenditure.

Furthermore, we show that the increase in R&D expenditure of firms with high FIO leads to higher innovation outcomes. Using data on patent applications and textual data on product announcements, we show that firms in the *Bandwidth* with FIO that increase R&D expenditures subsequently file for more patents and announce more new products compared to firms with low FIO.

Finally, we focus on the channel through which FIO can affect innovation and CSR choices of emerging market firms. There are two broad possibilities - foreign institutions shifting their portfolio away from high CSR companies to more innovative companies (exit) or influencing investment choices of their portfolio companies (voice). Since CSR law qualification is contingent on high profits and market valuations, exit is a costly strategy for foreign institutions relative to voice. Indeed, we find that firms in the bandwidth with higher FIO have fewer shareholder proposals on socially responsible investments and lower support for such proposals that are put to the vote. Since large institutional investors typically sponsor these proposals, it highlights that these owners shift away from exerting social pressures,

We contribute to the literature in two broad ways. First, we contribute to the literature on the effect of FIO on emerging economies. It is an important question because FIOs are seen as an important driver of both sustainability practices and innovation activities in emerging market firms. These results reflect unconditional FIO choices of FIOs and are, therefore, likely to be confounded by economic factors. Our results indicate that, when faced with a tradeoff, these investors prioritize future profitability through innovation over corporate sustainability. These results shed light on conditional choices of FIOs and are likely to reflect their preference ordering.

Second, we contribute to the growing literature on sustainability regulations. In recent years, governments worldwide have increasingly focused on regulations regarding sustainable and socially responsible business practices. This includes non-financial reporting obligations, pressures to switch to environmentally friendly production technologies and to consider the interests of a broader set of stakeholders. This set of social and sustainability policies is disruptive to the traditional business practices of corporations and is costly to implement (McWilliams and Siegel, 2001; Chhaocharia, Sen and Xu, 2021). Extant literature shows that CSR regulation harms shareholders' wealth (Dharmapala and Khanna, 2018; Manchiraju and

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Rajagopal, 2017). The key insight from our study is that the aggregate long-term evaluation of these public policies must consider the localized effect on shareholder wealth and future competitive gains through enhanced innovation.

2 Data and Empirical Strategy

2.1 Sample Selection and Summary Statistics

We use the information on all listed Indian firms from Prowess, which provides data on the financial indicators of Indian firms. We start with all 8,431 firms listed on the two main Indian stock exchanges – the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE) for 2010-2019.[1] It is a commonly used sample selection criteria to examine R&D expenses in the Indian context (Helmers et al., 2017). This sample contains 76,380 firm-year observations. For our empirical models, we require that information on financial, corporate governance and ownership variables be available for a firm in all years of our sample period. This criterion restricts the sample to 41,412 firm-year observations. The sample firms' mean pre-tax profits, net worth, and sales turnover are ₹6,546 million, ₹13,918 million, and ₹23,674 million, respectively. Our sample's mean (median) R&D expenses are ₹360 million (₹23 million), and approximately 21% of firms have zero R&D expenses.[2]

Ownership data is collected from Prowess, Capital IQ and Orbis. From these sources, we obtain information about the fraction of equity shares of different ownership categories: Promoters (business group families) and foreign and domestic institutions. On average, promoters own 32% of shares of listed Indian firms. Institutional investors own 18%, of which 3% are foreign. We create a dummy, *High FIO,* if the fraction of FIO in a company is greater than p75 of the sample distribution (4.1%).

From these sources, we also identify the country of origin of the foreign institutional investors. Institutions from 31 countries own the equity of the sample firms. We use the Banerjee et al. (2022) criteria to classify these countries as High CSR (the US, EU, Australia and Canada) and low CSR countries (China, UAE, Saudi Arabia, Russia, South Africa, Brazil etc.).

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[1] Prowess covers over 50,000 Indian companies but our focus is on the subset of companies that have been listed on the two main stock exchanges: "All Companies listed on BSE & NSE Superset' is a set of companies that are or were listed on the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE) at least once even if it merged with another company or ceased to exist at some point in time." This choice ensures that our results are comparable with most published results on corporate innovation (Helmers et al., 2017)

[2] All variables are expressed in nominal terms as we use threshold values which are expressed in nominal terms.

Our main estimation sample is the subset of firms that can enter treatment by crossing only the profit threshold. Within this sample, we identify firms that qualify for compliance with the CSR regulation based on pre-tax profit, turnover, and net worth thresholds. 5,348, or 63%, of all firms qualify on at least one of the three criteria, and 1,261 firms qualify on all three. The CSR law commonly applies to Indian firms because they are over the profit threshold. The CSR regulation applies to 3,293 firms for crossing only the profit threshold, whereas 1,186 and 355 firms qualify by only crossing the turnover and net worth criteria. The estimation sample comprises 2,016 firms (19,639 firm-year observations) with pre-tax profits lower than ₹50 million.

Our empirical design focuses on firms with a narrow bandwidth around the pre-tax profit threshold (₹40 million to ₹49.99 million). We have 1,890 observations in this bandwidth with an average R&D of ₹37 million.[3] Table 1 presents the summary statistics, and Appendix 1 describes the main variables. Based on this data, we construct an *Innovative Firm* dummy, which equals '1' if a firm has applied for at least two patents in 2010-2013. These are the firms for which R&D is easier to scale up. We also create a dummy, *Innovative Industry*, which equals '1' if the collective number of patent applications of all firms in that industry between 2010-2013 is in the top quartile of the industry-wide patent application distribution.

We collect data on patents filed by Indian firms from the Controller General of Patents, Designs & Internal Trademarks database (CGPDT). We retrieved the data from their web portal inPASS, which contains all patent data in India filed from 2005 onwards. We extract all patent applications from January 2010 to December 2019, where the applicant's country of registration is filed as "India". It leads to a sample of approximately 89,000 patents.[4] We use a fuzzy matching algorithm to associate the firm names in the patent application to that of the Prowess sample and manually check the quality of matches above a match ratio of 0.95. This results in a final sample of 26,631 patent applications of sample firms between 2010 and 2019. Using the patent data described above, we create a variable, *#Patent Applications*, which measures patents filed by a firm. The mean (median) of patent applications of Indian firms is 0.65 (0.43).

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[3] We use current R&D expenses in our main analysis. This is because both GAAP and IFRS accounting systems, which are used in India, specify R&D to be expensed rather than capitalized, with few exceptions. Therefore, R&D capitalization is uncommon for Indian firms. In appendix 11 we show that the results are qualitatively similar if we use the sum of current + capital R&D expenses.

[4] The distribution of patent applications over the years and by the applicant type is shown in appendix 2.

In addition, we collect information on new product announcements from the Lexis Nexis database. We first searched Lexis Nexis for Indian firms' press releases, combining the keywords "New Products" and "New Brands" with "Launches", "Release," and "Unveil." Next, we extract the new product announcements from January 1, 2010, to December 31, 2019, published in the leading Indian English-language newspapers.[5] We have 16,302 new product announcements using this extraction technique within the sample period. We download all press releases and parse the firm names, identifiers, and announcement dates from the text. We then fuzzy match the names of the patent applicants with the firm names in our sample. Our sample firms launched 35,793 new products. Finally, we count how many times a firm appears in the dataset in a year to create the variable #*New Products Announced*. The median (median) number of new products announced is 0.87 (0.79).

Finally, we use the 2-digit National Industrial Classification (NIC), similar to the SIC codes, to identify the primary industry classification of Indian firms.[6]

[Table 1A here]

Table 1B compares a subsample of firms with high and low foreign institutional ownership. We categorize firms as high (low) if the FIO is above (below) the 75th percentile of the FIO distribution (9.9%) for the full sample. The variables with statistically significant differences in group means at the 1% level are presented in the table below. Firms with high FIO have, on average, higher R&D and CSR expenses, more patent applications and new product announcements within the sample period, higher profitability and lower ownership of promoter families.

[Table 1B here]

3. Methods and Results

Our analysis focuses on firms in the $Bandwidth$ (pre-tax profits between ₹40 million to ₹49 million). The control group in these regressions consists of firms further beneath the profit threshold (with pre-tax profits below ₹40 million). We estimate a model with $Ln\ 1 + R\&D$ as the dependent variable and the interaction of $Bandwidth$ and $Post$ as the DiD estimator. The following control variables are included: firm size, ROA, log of total assets, exports (as a percentage of sales), technology imports and raw materials imports (also expressed as a

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[5] We provide the complete list of the newspapers in appendix 2.
[6] We use the NICs from the 2008 update.

percentage of sales), the board size, board independence, shareholdings of promoters, institutions and foreign owners, and a dummy that equals '1' if the firm is part of a business group. These control variables account for firm characteristics correlated with R&D expenses (Ambrammal et al., 2014; Jain and Krishnapriya, 2020). These variables allow us to hold constant variations in firm size, profitability, export orientation, technology inputs, ownership structure, and corporate governance attributes.

We estimate the following model with firm and year-fixed effects (f_i and k_t) and the standard errors clustered at the firm level:

$$Ln\ 1 + R\&D\ = \beta_1 Bandwidth\ x\ Post\ x\ High\ FII + \beta_2 Post + \delta Z_{it} + f_i + k_t \qquad (1)$$

The estimate β_1 provides the estimates of the effect of the CSR law on R&D expenses of firms with high FIO.

We estimate equation (2) variants with different fixed-effects structures in alternate specifications. Specifically, we estimate models including the $Bandwidth$ dummy with industry and year fixed effects and (2-digit) industry-year fixed effects. Naturally, in these models, we exclude firm fixed effects.

[Table 2 here]

We estimate whether this effect varies with the origin of the FIO - do institutional investors from low CSR countries drive our results? Our baseline results hold for firms with high FIO from high CSR and low CSR-sensitive countries.

[Table 3 here]

We also estimate regressions analogous to equation (2) for other corporate expenses, such as compensation, overhead, professional service costs (audit, consulting, and legal fees), and depreciation. We see no change in these expenses for high FIO firms close to the threshold. We report these results in the appendix.

Selection Effects

Selection effects could confound the reported result above - FIOs buying into more innovative firms rather than driving the change. To address this concern, we estimate a Bartik-type model based on the growth in FED liquidity. In the first stage, we estimate FIO at the firm level based

on the FIO of the firm in 2010 and the growth of US FED's securities held for monetary purposes. In the second stage, we estimate the effect of FIO on the R&D expenses of firms.

The underlying rationale is that the growth of the FED balance sheet leads to increased liquidity of FIOs. Since emerging market firms have higher growth potential, FIOs are likely to increase their holding of these firms. Which firms do they buy into? We argue that the flow of increased liquidity follows the same distributional pattern as before the FED growth. Indeed, we show that FIO holding increases following FED growth in Indian firms. Firms with higher FIO holdings are more likely to increase their R&D expenditure, specifically if they are in the *Bandwidth.*

[Table 4 here]

FIO and Innovation Outcomes

A salient question in this regard is whether the increased R&D expenses lead to enhanced innovation outcomes. If the increase in R&D expenditure is efficient, we should expect to see an effect on innovation outcomes such as patent applications and new product development in subsequent years. Therefore, we estimate the effect of increased R&D expenses of firms in Bandwidth with higher FIO relative to firms with lower FIO.

In table 5, we show that firms in the bandwidth with high FIO that increased their R&D expenses after the CSR law, on average, file for 0.7 new patents and announce 0.5 new products. These results indicate that FIOs drive efficient innovation in emerging market firms.

[Table 5 here]

Mechanisms

It is important to highlight the mechanism underlying the effect of FIO on corporate innovation. We examine the effect of shareholder voice by focusing on two aspects - the number of shareholder proposals on socially responsible investments (SRI Proposals) and the fraction of votes in favour of such proposals. We show the results in table 6.

Firms in the *Bandwidth* with high FIO receive approximately one less shareholder proposal post-CSR law than before the law. For shareholder proposals on tabled SRI issues, they receive 3.2% fewer votes. Therefore, these results indicate that in the post-CSR law period, FIOs deprioritize CSR for firms close to the qualification threshold.

[Table 6 here]

4. Conclusion

In this paper, we show how foreign investor preferences influence the investment decisions of emerging market firms. We use the lens of the Indian CSR law and show that firms with high FIOs engage in real earnings management by increasing R&D expenses to avoid mandatory expenses on social projects. Foreign investment from countries with high and low social sensitivity is associated with a strategic increase in R&D expenses. The increased R&D expenses lead to subsequent gains in innovation outputs like patent applications and new product announcements. We also establish that FIOs affect this strategic choice by deprioritizing shareholder proposals on socially responsible investments and casting fewer votes on such proposals. Our results indicate that, when faced with a tradeoff, these investors prioritize future profitability through innovation over corporate sustainability. These results shed light on the strategic involvement of foreign investors through their holding in emerging market firms.

References

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Table 1A

Summary Statistics

This table presents the summary statistics of our sample of listed Indian firms from 2010 to 2019. All monetary variables are in a million Indian Rupees and winsorized at the 1%. All variables are defined in Appendix 1.

Variable	N	Mean	Std Dev
R&D Expenses	41,412	360.23	1568.69
CSR Expenses	41,412	21.77	46.09
%FIO	41,412	3.08	7.78
%Shareholding-Promoters	41,142	32.09	29.18
%Shareholding-Institutions	41,142	18.38	31.77
Advertising Expenses	41,412	242.42	1326.69
Compensation Expenses	76,380	2485.47	17388.98
Professional Services Expenses	41,142	7.059	57.04
Depreciation	76,380	990.38	7277.97
Overhead Expenses	76,380	728.32	4889.59
Firm Size (Total Assets)	76,380	69145.77	629385.70
ROA	76,380	0.058	0.23
Net worth	41,142	13918.30	83608.27
Sales Turnover	76,380	23674.06	159141.20
Profit Before Tax	76,380	6546.48	50381.29
Exports (% Sales)	41,142	22.78	28.01
Technology Imports (% Sales)	41,142	18.51	38.19
Raw Materials Imports (% Sales)	41,142	13.08	32.59
Board Size	41,142	12.35	7.39
Board Independence	41,142	0.46	0.30
Business Groups	41,142	0.32	0.44
Patents	41,142	0.65	0.99
New Product Announcements	41,142	0.87	0.79
HHI	41,142	0.645	0.18

Table 1B

Comparison of Firms with high and low FIO

This table compares firms with high (above p75) and low (below p75) foreign institutional ownership from 2010 to 2019. All monetary variables are in a million Indian Rupees and winsorized at 1%. All variables are defined in Appendix 1.

Variable	High FIO	Low FIO	Difference
R&D Expenses	408.32	310.02	98.3***
CSR Expenses	24.36	18.36	6.00***
%Shareholding-Promoters	26.24	39.77	-13.53***
%Shareholding-Institutions	21.36	15.35	6.01***
ROA	0.109	0.032	0.077***
Exports (% Sales)	26.84	19.97	6.87***
Patents	0.74	0.41	0.33***
New Product Announcements	0.90	0.69	0.021***

Table 2

Section 135 and R&D Expenses of Firms near the Profit Threshold

This table shows the CSR law's R&D expenditure of firms with high FIO below the pre-tax profit threshold (and below the net worth and sales turnover threshold). The sample size is 2,016 companies with 19,639 firm-year observations. The dependent variable in all specifications is the natural log of 1+R&D expenses. In column 1, we show the effect of Section 135 on the R&D expenses of companies in the *Bandwidth* (indicator = 1 if the pre-tax profit is between ₹40 million to ₹49.99 million in *Post* (indicator = 1 for years 2014-2019) with firm fixed effects. Column 2 estimates the specification in column 1 with industry and year dummies. Column 3 shows the baseline effect with industry-year fixed effects. All specifications include the following controls: firm size, ROA, log of total assets, exports (as a percentage of sales), technology and raw materials imports (as a percentage of sales), the board size, board independence, shareholdings of promoters, institutions and foreign owners, and business group dummy. All variables are defined in Appendix 1. Standard errors are clustered at the firm level. ***, **, and * represent statistical significance at 1%, 5% and 10% levels, respectively.

Dependent Variable	Ln (1+R&D)		
	(1)	(2)	(3)
Bandwidth x Post x High FIO	0.019**	0.023**	0.018**
	(0.007)	(0.009)	(0.008)
Bandwidth		0.011	
		(0.009)	
Post	0.031	0.024	0.022
	(0.024)	(0.019)	(0.016)
Two-way interactions	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes
Firm Fixed Effects	Yes	No	No
Year Dummies	Yes	Yes	No
Industry Dummies	No	Yes	No
Industry-Year Fixed Effects	No	No	Yes
N	19,639	19,639	19,639
R^2	0.357	0.210	0.278

Table 3

Section 135 and R&D Expenses of Firms near the Profit Threshold

This table shows the CSR law's R&D expenditure of all firms below the pre-tax profit threshold (and below the net worth and sales turnover threshold). The sample size is 2,016 companies with 19,639 firm-year observations. The dependent variable in all specifications is the natural log of 1+R&D expenses. In column 1, we show the effect of Section 135 on the R&D expenses of companies in the *Bandwidth* (indicator = 1 if the pre-tax profit is between ₹40 million to ₹49.99 million in *Post* (indicator = 1 for years 2014-2019) with firm fixed effects. Column 2 estimates the specification in column 1 with industry and year dummies. Column 3 shows the baseline effect with industry-year fixed effects. All specifications include the following controls: firm size, ROA, log of total assets, exports (as a percentage of sales), technology and raw materials imports (as a percentage of sales), the board size, board independence, shareholdings of promoters, institutions and foreign owners, and business group dummy. All variables are defined in Appendix 1. Standard errors are clustered at the firm level. ***, **, and * represent statistical significance at 1%, 5% and 10% levels, respectively.

Dependent Variable	Ln (1+R&D)	
	(1)	(2)
Bandwidth x Post x High CSR Country FIO	0.012**	
	(0.005)	
Bandwidth x Post x Low CSR Country FIO		0.022**
		(0.009)
Two-way interactions	Yes	Yes
Level Dummies	Yes	Yes
Control Variables	Yes	Yes
Firm Fixed Effects	Yes	No
Year Dummies	Yes	Yes
N	16,244	18,087
R^2	0.227	0.304

Table 4

Bartik Estimates for Selection Effects

In this table, we estimate the effect of FIOs on R&D expenses of Indian firms using a Bartik-type instrumental variable approach. The first stage presents the effect of monetary expansion in the US on the FIO of Indian firms and the second stage shows the effect of FIO on R&D expenses. All specifications include year dummies and odd (even) numbered columns provide estimates without (with) firm fixed effects. ***, **, and * shows statistical significance at 1%, 5% and 10% levels, respectively.

	First Stage FIO		Second Stage Ln (1+R&D)	
	(1)	(2)	(3)	(4)
FIO_{2010} x FED Growth	0.432***	0.239***		
	(0.118)	(0.068)		
FIO			0.059**	0.047**
			(0.023)	(0.024)
Level Dummies	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes
Firm Fixed Effects	No	Yes	No	Yes
Year Dummies	Yes	Yes	Yes	Yes
N	19,639	19,639	19,639	19,639
F-test Weak Instruments	13.40	12.35		

Table 5

Effect of FIO on innovation outcomes

This table shows the effect of FIO-driven innovation on the innovation outcomes of Indian firms. Columns 1 and 2 show the effects of patent applications and new product announcements. All specifications include year and industry dummies. ***, ** and * represent statistical significance at 1%, 5% and 10% levels, respectively.

	Patent	New Product
	(1)	(2)
Bandwidth x ΔR&D >0 x High FIO	0.701**	0.487**
	(0.304)	(0.233)
Two-way Interactions and Level Dummies	Yes	Yes
Control Variables	Yes	Yes
Year Dummies	Yes	Yes
Industry Dummies	Yes	Yes
N	19,639	19,639
R^2	0.357	0.210

Table 6

Mechanisms of FIO's impact

This table provides evidence of the mechanism underlying the effect of FIO on strategic avoidance of the Indian CSR law. In column 1, we show the effect of high FIO on firms close to the qualification threshold on shareholder proposals on socially responsible issues; in column 2, we show the effect on votes in favour of such proposals. ***, ** and * represent statistical significance at 1%, 5% and 10% levels, respectively.

	SRI Proposals	Vote in Favour
	(1)	(2)
High FIO x Post x	-0.922***	-0.032**
Bandwidth	(0.188)	(0.014)
Two-way interactions	Yes	Yes
Control Variables	Yes	Yes
Industry Dummies	Yes	Yes
N	19,639	19,639
R^2	0.321	0.165

Appendix 1

Variable Description and Data Source

Variable	Definition	Source
R&D Expenses	Annual current expenses incurred by the company on research and development.	Prowess
ΔR&D >0	Dummy = 1 if the firm's average R&D expense in the (2014-2019) period is higher than the firm's average R&D expense in the (2014-2019) period.	Authors' Calculation
Patent Applications	Number of patents filed by the company in a year	
New Product Announcements	Number of new products announced by the company in a year	
Firm Size	Natural log of total assets	Prowess
ROA	Return on Assets is calculated as net income divided by total assets.	Prowess
Net worth	Money put invested into the firm by the shareholders in equity capital, and the firm's profits generated and retained as reserves.	Prowess
Sales Turnover	Income generated by firms from the sale of goods manufactured or from the sale of minerals extracted and classified as the sale of goods.	Prowess
Profit Before Tax	Profit remaining after meeting all expenses but before paying taxes.	Prowess
Export (% Sales)	Export earnings as a percentage of sales	Prowess
Board Size	The number of directors on the board.	BoardEx
Board Independence	The proportion of independent non-executive directors on the board.	BoardEx
%Shareholding-Promoters	Percentage of shares outstanding owned by and associated with the family with the controlling stake in the firm	Prowess
%Shareholding-Institutions	Percentage of shares outstanding owned by institutions such as banks, insurance companies, hedge funds, and mutual funds	Prowess
%Shareholding -Foreign	Percentage of shares outstanding owned by foreign individuals and institutions	Prowess
Business Groups	Dummy equal to 1 if the firm is part of a business group, 0 otherwise	Prowess
Innovative Firms	Dummy equals 1 if a firm applied for at least two patents in 2010-2013.	Prowess

Innovative Industries	Dummy equals 1 if the collective number of patent applications of all firms in that industry between 2010-2013 is in the top quartile of the industry-wide patent application distribution.	Prowess
Large Firms	Dummy = 1 if a firm is in the top quartile of the total assets' distribution	Authors' Calculation
Manufacturing	Dummy = 1 if the primary industry classification of a firm is the manufacturing sector	Authors' Calculation
No Previous Patents	Dummy = 1 if a firm has not filed any patent applications in the 2010-2013 period	Authors' Calculation
Preference Sector	Dummy = 1 if the primary industry classification of a firm is biotechnology, pharmaceuticals, or energy	Authors' Calculation
High FIO	Dummy = 1 if a firm is in the top quartile of the FIO distribution of the sample firms	
High Exports	Dummy = 1 if a firm is in the top quartile of the export distribution of the sample firms	
HHI	The sum of the squares of the market share of each firm in an industry	Authors' Calculation

Appendix 2

List of English Newspapers

1. The Times of India
2. The Financial Express
3. Mint
4. The Telegraph
5. The Indian Express
6. The Hindu
7. The Statesman
8. The Economic Times
9. The Tribune
10. The Deccan Herald
11. The Business Standard
12. The Hindu Business Line
13. The Financial Times
14. Money
15. Bloomberg Businessweek
16. Fortune