



Globalization and convergence in corporate governance: evidence from Infosys and the Indian software industry

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Abstract

In contrast to the much-studied role of capital markets in fostering convergence in corporate governance practices worldwide, we argue that the globalization of product and talent markets has affected corporate governance of firms in the Indian software industry. We model several possible reasons why a particular firm, Infosys, has emerged as the exemplar of good corporate governance in India, traditionally a backwater of corporate governance practices. We further analyze the manner in which Infosys has attempted to shape corporate governance practices in India more generally, and why these attempts have had limited effects thus far. *Journal of International Business Studies* (2004) 35, 484–507.

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Introduction

We document the under-studied effect that global product and labor markets can play in the convergence of corporate governance systems worldwide. This complements our understanding of the much more extensively-studied role of capital markets in fostering such convergence through, for example, cross-border listings and global institutional investor activism.

The software industry offers a unique setting to test the role of global product and labor markets for two reasons. First, for a large part of the industry, there is a global market for technical talent. Second, capital plays a smaller role in software than in most other global industries. Thus, one can, to some extent, isolate the impact of global talent markets from the effect of global capital markets, although, admittedly, it is harder to disentangle the effects of global talent from global product markets.

Further, the emergence of the Indian software industry offers a unique experimental setting to ask whether globalization can promote convergence in corporate governance. This is because India is home to a globally competitive set of software powerhouses and because India is generally very far from world standards in what constitutes good corporate governance. The success and generally positive reputation of India's software firms – in contrast to most of India's other firms – provides at least surface credence to the idea that the global markets to which these firms are exposed has affected their governance systems.

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This is the proposition that we explore in depth through a case study of the Indian software industry, and of one of India's leading software companies, Infosys. The popular press frequently cites Infosys as a model for sound corporate governance in India and, indeed, in Asia.¹ In our research, we ask why it is that Infosys developed a reputation for being committed to shareholder value creation in a country, India, where corporate governance has, historically, not been a first-order concern. We also attempt to document the extent to which the corporate governance practices of Infosys are to be found in other Indian software firms and among Indian firms more generally.

Our interviews with the top management of Infosys, and related field research in India, suggest that exposure to global capital markets is a result, rather than a cause, of Infosys' decision to adopt world corporate governance standards. The proximate cause of the aspiration to good corporate governance at Infosys, in turn, is its need to attract talent with truly worldwide options, which in turn is necessitated by fierce global product market competition.

Part of our narration of the Infosys corporate governance case study is a description of the efforts on the part of its management to help institutionalize good corporate governance in India. Indeed, diffusion of corporate governance practices in India is rendered partly feasible by a coalition between firms and regulators that serves to educate regulators and provides a blueprint for engineering a transition from a stakeholder to a shareholder-based corporate governance system.

Ultimately, however, the corporate governance standards at Infosys are the exception rather than the norm in India. Some data on corporate governance in India suggest that most firms fall far short of the Infosys benchmark, including most firms within the software industry. Further, our companion large-sample econometric analysis suggests that there is very little evidence that globalization of any form is correlated with adoption of US-style corporate governance around the world (Khanna *et al.*, 2001). We therefore dedicate the last part of the paper to exploring why the effect of globalization on corporate governance convergence might be limited.

The case study is based on interviews and field research at Infosys in early 2001, and with several dozen field interviews with competitors and regulators over the past three years. In the remainder of the paper, we first briefly summarize the state-of-

the-art literature on convergence of corporate governance. We then provide, in the following two sections, brief overviews of the Indian software industry and of the state of corporate governance in India in the 1990s. The subsequent two long sections constitute the analytical heart of the paper. We first consider three, non-mutually exclusive reasons for Infosys' adoption of corporate governance practices. As part of this section, we develop a model to demonstrate the interaction between Infosys, its competitors and the regulator in the corporate governance adoption process. The next section considers why the spillovers of Infosys' corporate governance practices to other firms have ultimately been limited, and why globalization has not hastened corporate governance convergence in the aggregate. A final section presents our conclusions.

Theoretical perspectives on convergence in corporate governance

The idea of convergence in 'form', or literal convergence, postulates that efficiency considerations and, implicitly, some form of global competition, will dictate that all nations will ultimately adopt the same corporate governance system. This view is most forcefully expressed by Hansmann and Kraakman (2000) in their paper entitled 'The end of history for corporate law.' They, and numerous earlier proponents of this view (see, for example, Karmel, 1991), point to the current consensus that the anointed system towards which convergence in form will occur is that of the US. Skeptics aver, however, that it is plausible that countries' systems can fall from grace – witness the favor in which Japan was held in the 1980s and early 1990s and its current disfavor – suggesting that the current consensus will be short-lived. Further, there have been several theoretical arguments for pros and cons of different systems. Failure to agree on the end-state of convergence, in turn, calls into question the idea of convergence in form.²

A less extreme perspective rests on the idea that there is sufficient plasticity in each country's institutions so that the key function of corporate governance – the protection of resource providers – can be largely achieved within the constraints of the country's institutions. This perspective is referred to as 'functional convergence' by Gilson (2000).³ The idea of functional convergence *per se* has a long pedigree in social science (Merton, 1968), and has recently been applied to financial systems more generally (Crane *et al.*, 1995).

At the other extreme from the convergence in form perspective is one that forcefully claims that path dependence has led different economies to very different corporate governance systems, and that these are not easily dislodged, not even by global competition (Bebchuk and Roe, 1999). One reason why even functional convergence might not obtain is that there remains considerable disagreement about the functions of corporate governance. Specifically, should corporate governance systems primarily protect providers of capital, or also cater to other stakeholders in the firm, notably labor (Shleifer and Vishny, 1997; Tirole, 2001)?

Whether convergence occurs in form or function, some form of global competition is implicitly assumed to be the proximate cause. Perhaps most emphasized is the idea that global institutional investors, largely originating from the US, will flex their muscle and compel firms that demand their funds to adopt corporate governance standards with which they are familiar.⁴ Also often emphasized is the idea of a sorting of a country's firms, with the higher quality ones listing in centers of global capital (most commonly, New York and London) and the lower quality ones remaining in the home country, with resultant pressure on the local capital markets to upgrade (Coffee, 1999).⁵ The consensus view on the causes of convergence assigns considerably less importance to global product market competition forcing convergence, and none at all to global talent market competition forcing convergence.

The Indian software industry

In this section, we focus on the role that the Indian software industry plays within the global software industry. The discussion is necessarily limited. The section draws on a variety of sources, including Heeks (1996), Ghemawat *et al.* (1999) and Kapur and Ramamurti (2001). Fuller accounts of the software industry may also be found in these works. As an organizing device, we first describe the supply and demand sides of the Indian software industry, and then describe industry features that illuminate the industry equilibrium. Table 1 shows a timeline.

Supply side

Firms in the industry include older firms diversifying into software services, often from completely unrelated (in a product market sense) businesses, as well as *de novo* startups. Prominent firms in the former category include Tata Consulting Services (TCS, part of the House of Tata), Satyam and Wipro

Technologies. Prominent examples from the latter category include Infosys and PCS.

Approximately 70% of the cost structure of a software company is accounted for by personnel related costs. India's initial entrée into the software business has to do with its access to cheap talent. India produces more engineers and scientists than every country in the world other than the US. The key feature of the talent is that it is much more globally mobile than labor in general. Indians (especially programmers), in particular, account for more than 40% of the H1B visas (temporary work visas) issued by the US to foreign talent. Further, the Indian diaspora, long-established successfully in the US, has played a key role in facilitating the flow of talent back-and-forth between India and the US (Kapur and Ramamurti, 2001).

Indian firms compete vigorously in the global product market. Firms from countries like Russia, Ireland and the Philippines are prominently cited as direct competitors, for example. Software firms from advanced economies like the US are also indirect competitors, in that clients may choose between generally more sophisticated services from these expensive advanced-economy firms and the less sophisticated but cheaper services from emerging economies.

What role has the government played in facilitating the operations of Indian firms? Heeks (1996) points out that there have been fits and starts in the liberalization process pre-1991. Since 1991, the government has largely stayed out of the way and allowed the software industry to compete in an unfettered way. As Zaheer and Rajan (2001) point out, the last two areas to be deregulated were internet access in 1998 and international bandwidth provision in 1999. The party currently in power (as a leader of a coalition), the Bharatiya Janata Party (BJP), was the first to explicitly support the software industry in its election manifesto. An interesting feature is that most of India's state governments have explicit information technology promotion policies and compete to attract firms to their states. The formation of the industry lobbying group, NASSCOMM, provides an efficient means for dialogue between the private sector and the various state and central governments.

Demand side

Three types of demand for software services existed that were relevant to India.⁶ At the low end was the demand by foreign firms for on-site services, also

Table 1 The emergence of growth of Indian software industry – a timeline (illustrating salient events in the history of the Indian Software Industry)

1950	}	Installation of the first mainframes in Indian research institutions (slow rate of computerization)	
1960			
1968		Tata industrial group setups the first independent Indian software firm, Tata Consultancy Services (TCS).	
1970			
1974		TCS begins to export software in turn for being able to import hardware	
1980	}	Other Indian software firms established (the beginning)	
1988	}	Industry begins to flourish, with many new software companies joining	} 150,000 English-speaking engineers and holders of science degrees graduate each year in India. Tata Infotech and Wipro list on BSE. Reform program launched by Indian government
1990			
1991		Onsite services (Bodyshopping)	
1992	}	Offshore methodology	} Satyam lists on the BSE Infosys lists on BSE
1993			
1994			
1998		March – Infosys is the first Indian software company to list on the NASDAQ	} Indian software exports mostly low-end services. Relyon transient demand for things like fixing the millenium (Y2K) bug
1999		June – Securities & Exchange Board of India (SEBI) sets up a Committee on Corporate Governance	
		October – Satyam is the second Indian software company to list on the NASDAQ	
2000		January – SEBI adopts principles recommended by its Committee on Corporate Governance	} Indian software companies begin to move up the value chain. Most leading Indian software companies are forging strong partnerships with overseas partners.
		June – Silverline Technologies lists on NYSE. Rediff.com lists on NASDAQ	
		July – Aptech lists on LSE	
		October – Wipro lists on NYSE	

referred to in a derogatory sense as ‘bodyshopping’. This practice involved Indian programmers relocating to the host country, typically for a short period of time and for significantly lower wages than local programmers in the host country. Clients generally received the services of the programmer ‘bodies’ with much less by way of organizational knowledge from the software firms. One reason why many Indian software companies started this way had to do with their lack of access to appropriate hardware in India, in turn caused by regulatory (typically foreign exchange) restrictions.

The other type of demand was by foreign, primarily US companies, for Offshore Development Centers. These were physical locations in India that companies dedicated to the needs of a particular

advanced-economy multinational, where teams of Indian programmers and some personnel from the foreign company worked together for long time periods and with more intensive knowledge exchange. The third type of demand was a mixture between bodyshopping and the offshore development centers.

Equilibrium

Several indicators of India’s success in the global software industry are worth reviewing. The Indian software industry grossed \$5.7 bn in revenues in 1999–2000, \$4 bn of which came from software exports. This represented a growth rate of 53% over the prior year. Software exports were 10% of India’s total exports. Software industry market



capitalization on Indian stock exchanges rose from \$4bn in January 1999 to a high of \$90bn, and then, following the NASDAQ crash and its ripple effect in India, settled at \$55bn by mid-2000. By then, 185 of the Fortune 500 outsourced their software requirements to India.

Given the cheap talent and the initial absence of reputation, Indian firms started out at the low end providing primarily bodyshopping services. They gradually built reputations for reliability and high quality of services and began to provide more value-added services (Banerjee and Duflo, 2000). By 1999–2000, offshore services, the more value-added part of the Indian software firms' offerings, had risen to 58% of export revenues from 5% in 1991–1992. Five of the nine software development centers in the world with CMM Level 5 ratings, the highest ratings on the predominant quality scale developed for software at Carnegie-Mellon University, were located in India. Companies like General Electric, Citicorp and IBM had their only CMM-certified operations in India rather than in the US.⁷

The upgrading of the Indian software industry was expected to continue. Expected revenues by 2008 were set in the neighborhood of \$87bn by a NASSCOMM–McKinsey study, as long as government continued to remove bottlenecks for the development of the software sector. Talent now increasingly captured a piece of the software pie, partly as a result of global pressure on domestic wages. A Jardine Fleming study suggested that the costs of an Indian programmer had risen to as much as \$3000/month (although this was still 1/3 of the costs of a US programmer).

It is worth emphasizing that the Indian software industry was exposed to global product and global labor markets before raising capital overseas ever became an issue.⁸

The standards of corporate governance in India⁹

As late as the early 1990s, corporate governance was not a well-understood concept in India. Indeed, until 1991, the objective of government policy was to maximize loans to the industrial sector in the belief that this would lead to industrial development and employment creation. Monitoring of the loans was not a major priority. The major financial institutions, which were government owned and controlled, were often instructed not to disturb management, and to side with them in the event of any dispute; they virtually never divested their ownership stake in any firm. Second, financial

institutions were never provided with any incentives to monitor. Pouring more money after a bad loan, in the hope that the distressed firm would find its way out of trouble, was consistent with the objective of maximizing loans. Attempting to shut down distressed firms was prohibitively costly. Third, competition among financial intermediaries was non-existent for several reasons. Regulations had eliminated the possibility of most bases of competition. The Indian Banks Association (IBA) functioned as a *de facto* cartel, fixing wages, prices and service conditions. Firms granted a license under the pre-1991 'license raj' more or less were guaranteed financial support from state-run financial institutions. Finally, intermediaries, most of whom were government owned, were not monitored themselves. As of 2001, corporate governance scandals were discussed almost routinely in the Indian business media.¹⁰

In addition to the absence of potential monitoring by banks, there were also constraints on monitoring by external capital markets. The Companies Act placed restrictions on the acquisition and transfer of shares, and so prevented the development of a market for corporate control. With half to two-thirds of the equity in any firm being illiquid (since the entrepreneurs and the financial institutions never sold their shares), takeovers were difficult to implement.

However, several positive developments occurred on the corporate governance front since India's 1991 balance-of-payments crisis: (a) The Securities and Exchange Board of India (SEBI) Act of 1992 created a regulatory body with the explicit mandate to improve the functioning of Indian financial markets. (b) The incentives of the state-run financial institutions to monitor were improved. They began to be weaned off their historically privileged access to funds. The resulting need to access public capital markets made them more conscious of the bad loans on their balance sheets. Deregulation of interest rates and the gradual elimination of consortium requirements increased competition among the financial institutions. Private sector mutual funds were allowed to compete with the state monopoly. (c) A takeover code was introduced in late 1994, after a public outcry over legally sanctioned price rigging.¹¹ (d) Restrictions on the entry of foreign investors were eliminated and regulations on their investments were substantially clarified.

However, Indian corporate governance was still deficient for multiple reasons, including the

following: (a) SEBI had found that it had insufficient powers to police violations of regulations. It continued to adapt and modify regulations as it learned more about how to regulate financial markets. (b) Takeovers continued to be difficult given the paucity of timely information and high transactions costs in both the primary and secondary equity markets.¹² (c) There was still little competition among financial intermediaries. The state-run intermediaries were still saddled with bad loans, which affected their ability to act as monitors. (d) Disclosure problems continued to abound. Requirements under the Companies Act were not stringent. Financial results were published only at half-yearly intervals, and the absence of consolidated accounts reduced the transparency of firm performance.

Some data from Credit Lyonnais Securities Analysis (CLSA) supports this assessment of the current state of Indian corporate governance. The data are from a set of questions regarding corporate governance administered to 482 companies in 24 emerging markets in 2001. The companies are generally the ones of greater interest to foreign investors, typically characterized by some subset of the following characteristics – large size, greater equity float and foreign listings. When we ranked countries by the mean corporate governance score constructed by CLSA, we found that India ranked in about the middle. Since most countries in these data have poor average corporate governance (with some exceptions like Hong Kong and Singapore), and since the selected companies are generally the better governed ones, this confirms the characterization offered above.

Governance in the Indian software industry

The same CLSA data, however, also point out that the corporate governance ratings of the software firms are higher than those of other Indian firms. The mean ratings for software firms (of which there are eight in the CLSA data) and for non-software firms (of which there are 72) are, respectively, 64.3 and 54.7 (minimum of 0 and maximum of 100), with the difference statistically significant with a *P*-value of 0.02. The medians are, similarly, 62.9 and 53.8, with the difference statistically significant with a *P*-value of 0.2.

The data also confirm that software firms are, on average, more exposed to global competition than other Indian firms. To ratify this assertion, we supplemented CLSA data with a variety of indicators of global competition. Software firms are more

likely to be traded on a US stock exchange (*P*-value 0.02) and on the London Stock Exchange (*P*-value 0.08) and more likely to be listed on the NYSE (*P*-value 0.01). Software firms garner a higher percentage of their revenues through exports (*P*-value 0.01), are more likely to employ foreign talent in senior managerial positions (*P*-value 0.01) and are somewhat more likely to employ a Big 5 accounting firm (*P*-value 0.12).¹³

Corporate governance at Infosys

We describe corporate governance at one of India's leading software companies, Infosys, the one most credited with adopting good corporate governance practices. A subsequent section considers reasons why Infosys adopted the practices that it did and the effects of this adoption on other firms in the software industry and in India more generally.

Brief introduction to Infosys

In 1981, seven software engineers started Infosys on a shoestring \$1000 budget. One of the seven, ultimately the public face of the company, was Narayan Murthy, a 1969 graduate of the Indian Institute of Technology, Kanpur. The fledgling company immediately focused on the demands of the international market, perceiving there to be insignificant domestic opportunity. The company grew slowly through the 1980s, almost going under in 1989. The early 1990s saw a confluence of two events – one internal to Infosys and one external. Externally, a foreign exchange crisis prompted the opening up of India to global competition and the scrapping of the stifling regulatory regime that had come to be known as the 'license raj.' Internally, the departure of a key founder prompted introspection at Infosys as to the right way to capitalize on the new external opportunities. The contours of the strategy that emerged were the following: shifting so as to do software development within India as opposed to purely at foreign clients' sites; a relentless focus on attracting and retaining talent; and conservative financing. Subsequent growth at the company was rapid. The company went public on the Bombay Stock Exchange in 1993, and on NASDAQ in 1999. It became the employer-of-choice not just in the Indian software industry but in India more broadly, was identified as the public face of India's globally competitive software industry and accepted as Asia's leading information technology firm. Murthy, with his spartan self-image, became a revered public figure and

spearheaded a general drive towards professionalism throughout the Indian corporate sector.

Corporate governance at Infosys

A centerpiece of the Infosys success story was the attention paid to corporate governance. (See Table 2 for a timeline of the adoption of various corporate governance practices.) Infosys prided itself on several 'firsts' in the Indian context, disclosing these in its annual reports (Kuemmerle and Coughlin, 2000). Interestingly, eight of the twelve such firsts had to do with adopting corporate governance practices far beyond those mandated by Indian corporate governance standards. We are cognizant that the idea of *functional* equivalence alluded to in our earlier literature review suggests that this may not be the only set of meaningful dimensions of the *form* which good corporate governance practices take. This critique, however, would apply to any chosen set of dimensions.

Financial reporting and disclosure

Infosys was the first Indian company to follow US GAAP (Generally Accepted Accounting Principles), to value human resources and voluntarily disclose such a valuation with the statement of accounts, to value its brand and disclose this information with the balance sheet, to distribute audited quarterly reports to all investors, to guarantee publication of audited annual balance sheets very soon after the close of the fiscal year (typically by April 15 for a March 31 year-end), to provide the audited balance sheet in soft copy format (floppy disks and CD-ROM) to investors and to make the balance sheet available on the internet. These reporting practices put Infosys at the leading edge of Indian practice in terms of financial reporting and disclosure.

Management compensation

Infosys was one of the first companies to offer stock options to all qualified employees (Kuemmerle and Coughlin, 2000), not just to senior management. The intention was to provide appropriate incentives for the employees to create shareholder value, and to share a part of the value created with the employees. Pay-for-performance was not adopted widely in India at this time.¹⁴ In fact, Indian regulations prohibited companies from distributing employee stock options. Infosys and the rest of the software industry, therefore, broke new ground in this respect by lobbying the government to change the regulations.

Board structure and practices

Infosys did not play as leading a role in ensuring a board that was comprised of independent directors, but was quick to remedy this deficiency soon after the adoption of other corporate governance practices. Currently, the company's board consists of several outsiders, including several international experts, and its practices for evaluating the performance of board members are considered cutting-edge.

However, the adoption of these various practices were symptoms of a more resilient underlying attitude that is worth noting. Infosys developed an unusual reputation for probity, honesty and transparency in all its dealings. Our interviews revealed several illustrative examples, three of which are described briefly below (in chronological order):

- (1) 'In 1984, when the company was working for Borland, it was importing software from the US. At the time you had to pay customs duties on the software (150%). Some companies creatively interpreted the law. To get around it companies would sell books (there was no duty on books) and manuals with floppies. If you had software that was worth \$60, they would say that the charge of the software was \$10 but the book to go with it was \$50. So they were able to avoid the duty and achieve higher margins. Infosys refused to do this, and said they would rather sell the software at half-price (lower margins) than try to circumvent the law.'
- (2) 'In 1992, Infosys gave a fixed price bid to a company. The fixed price was based on assumptions about the time and people it would take, etc. After a short while on the project Infosys realized it had vastly underestimated what the cost/time requirement would be. They had two choices: (1) to try to change the contract or (2) to honor the contract. The law would have permitted some room for Infosys to back out, but they didn't. They put more people on the project and honored the contract. 'Corporate governance is about honoring your commitments; to your customers, your employees, your investors.'
- (3) 'Infosys collected a lot of money through its public offering in the early 1990s. It was waiting for the government to give it clearance to invest that money in a subsidiary in

Table 2 Key events in Infosys' voluntary adoption of international corporate governance standards (illustrating salient events in the evolution of Infosys' corporate governance practices)

From founding (1981) to 1986:

Company founded on a shoestring budget of \$1000 contributed by seven founders who left another software startup, PCS. First project in New York. Global product company from the outset.

From 1986 to 1992:

General reluctance to use debt. Financing mostly through profit retention. Founders continued to contribute through acceptance of lower-than-market salaries.

1989:

90% of Infosys revenues came from work done at client sites outside of India. Uncompromising exposure to global product markets.

1993:

Among first-market priced IPOs in India (following removal of controls on IPO prices that existed prior to 1991).

1994:

Reporting per US GAAP caused by the need to present a clear picture to customers in the US.

1996:

Move toward having independent directors. Such directors do not hold stock in the company.

1997:

Development of an audit committee modeled on Blue Ribbon Committee's charter. Subsequently forms the standard for SEBI's recommendations of what audit committee should look like.

1997:

Webcast annual shareholder meeting. Post presentations made by CFO and CEO to analysts on the website.

1997:

Quarterly reporting initiated.

Late 1997:

Formed compensation committee comprised entirely of independent directors. Committee determined senior management compensation. This committee was set up because both NYSE and NASDAQ listings required this.

Early 1998:

Disseminated all press releases on web site.

1998:

Changed designations of senior management to suit global requirements to prepare for NASDAQ listing. Developed voluntary 10K form, which included an additional risk factor section. In India, risks were traditionally described but not evaluated. In India, there was not the same absolute liability associated with not analyzing risks as there was in the US.

March 1999:

NASDAQ listing. Infosys voluntarily opted to behave like a US domestic issuer, rather than subjecting itself to the less stringent standards of a foreign issuer.

2000:

Infosys was the first company worldwide to comply with new 20F regulations. Companies can file 10Q's and 20F's within 90 days of end of quarter and 190 days of end of year. Infosys typically files within 8–9 days. Infosys also distributes quarterly reports to US shareholders, though it is not required to.

the US. While it was waiting, several board members suggested that the money, instead of sitting in the bank, should be invested in Indian stocks. Infosys lost quite a bit of money in the ensuing transaction. Then there was the question of what you tell people about what happened. Most Indian companies would not have disclosed this, and Indian law would not require such disclosure either. But Infosys decided to disclose the losses. The board was ready to face the wrath of the investors, and they figured they would be kicked out and replaced. But when the meeting came, the investors said 'we respect what you have done. Because you have disclosed something when you are in trouble, we can trust you.' The real indicator of good corporate governance is how you respond in difficult times.'

Why did Infosys adopt good corporate governance measures?

Analytically this question can be answered in two parts. First, what factors explain Infosys' adoption of good measures, and, perhaps equally importantly, why did (most) other software firms not adopt similar measures?¹⁵ We consider these in turn.

Lack of capital market pressure

Infosys executives and others that we interviewed in India are quick to dismiss the idea that the corporate governance practices at Infosys were adopted to attract capital. Thus, Jayanth Verma, a member of the Securities and Exchange Board of India, stated to us,

The industry that probably needs capital the least, went after the international capital markets most aggressively... . In fact many of these companies don't know what to do with the capital they raised... . The pressures that the capital markets can put on a company that doesn't need to raise capital are next to nothing.

In this regard, it is also worth noting that many of the practices for which Infosys is lauded were adopted by the company far in advance of its NASDAQ listing and, indeed, in advance of its listing on the Bombay Stock Exchange in 1993.

Further, a high reliance on internally generated capital, and strict adherence to a zero debt policy, suggests that the stringent governance standards are unlikely to have been adopted purely to assuage the concerns of external capital providers.¹⁶ That Infosys was relatively less in need of capital is borne

out by an analysis of sources and uses of funds. Specifically, we examined the line items 'Cash from operations' and 'Cash used in investing activities' for Infosys and 166 other Indian software companies using data collected by the Center for Monitoring the Indian Economy (Mumbai). These data for Infosys were available for each of six years (1995–2000) and were available for the other firms for varying numbers of years (ranging from 1 to 6 years). We used a 'difference measure' – 'Cash used in investing activities' – 'Cash from operations' – as our crude measure of need for capital. Infosys had the third least need for capital out of 91 firms for which data were available in 2000, second least out of 89 firms in 1999, second least out of 63 firms in 1998, sixth least out of 54 firms in 1997 and second least out of 46 firms in 1996. Further, when comparison of the difference measure between Infosys and other software firms was restricted to those 14 firms for which we had a reasonable time-series (6 years), Infosys was the second least capital constrained of this set.

In contrast, the primary reason cited for adoption of the corporate governance measures is to gain credibility with customers in the rough-and-tumble of the software product market. This is especially so for a company originating in a country with a baggage of negative corporate governance. Equally important is the need to be transparent and forthcoming with talent that has truly global options. Infosys remains an employer of choice on the campuses of the leading Indian engineering and management schools today.¹⁷ Of course, these reasons are inter-related. The talent is needed in order to be able to successfully compete in the product market.¹⁸

To shed some further light on the kinds of factors that might have caused Infosys to adopt good corporate governance, we also conducted a small-sample detailed analysis of the latest annual reports of a set of Indian public companies that all have US listings – Videsh Sanchar Nigam Limited (VSNL, the state-run telephone company); Dr. Reddy's Laboratories (one of India's leading pharmaceutical companies); and Wipro Limited (a leading software company and Infosys rival).¹⁹ Some results of this investigation are in Table 3. Unsurprisingly, all conform to certain minimal standards required of companies listed on US exchanges, such as a reconciliation of the Indian GAAP accounting statements with US GAAP. However, there is quite a bit of variation in the extent to which other information is provided. The state-run VSNL

Table 3 Comparison of information content of annual reports of leading Indian companies with US listings

Information category	Infosys	Wipro	Dr. Reddy's labs	VSNL
Reconciliation with US GAAP	Yes	Yes	Yes	Yes
Profile of projects to signal technical competence	Yes	Yes	Yes	No
Discussion of risks of investing	Yes ^a	Yes	Yes	
Details of options grants	Yes ^a	Yes	Minimal	No
Brand and intangible asset valuation	Yes	No	Yes	No
Human resource valuation	Yes	No	Yes	No
Reconciliation with GAAP of countries other than India and US	Yes ^b	No	No	No
Reconciliation with recommendations of <i>ad hoc</i> corporate governance committees by country	Yes	No	No	No
Responses to frequently asked questions for shareholders	Yes	No	No	No
Honor rolls for valued employees	Yes	No	No	No
Letter from Directors addressed to:	Shareholders	Stakeholders	Stakeholders	NA

^aThe information in the Infosys annual report is considerably more detailed than in the others.

^bThese reconciliations are available in the languages of the country concerned, including in French, German and Japanese in the Infosys annual report. This table analyzes the kind of information available in the annual reports of four of India's leading companies that have issued American Depository Receipts. Infosys and Wipro and prominent software companies. Dr. Reddy's Labs is one of India's leading pharmaceutical companies. VSNL (Videsh Sanchar Nagar Ligam) is India's state-owned telephony provider, until very recently a monopoly.

provides the least information, at least along the profiled dimensions, suggesting that mere need to access capital markets is unlikely to explain Infosys' adoption patterns. Some would aver that this is an unfair comparison, given the lack of competitive pressures felt by what was until very recently a state monopoly.²⁰ Dr. Reddy's Laboratories, a pharmaceutical company in the vanguard of another knowledge-intensive industry, perhaps provides a fairer comparison. Indeed, it provides very interesting information on the value of its intangible assets, for example. However, it too falls short of the Infosys report in a number of ways. Thus, a company that clearly competes in global product and capital markets, but arguably not as much as software companies do in the global talent markets, does not disclose as much as does Infosys. The final comparison with Wipro, is perhaps the closest apples-to-apples comparison within the software industry. Again we see that a company that is as much in the throes of global product and talent competition falls short of Infosys, suggesting ultimately that there is an Infosys-specific effect, in addition to whatever effect can be attributed to the global software industry.

Table 4 shows the evolution of a set of corporate governance practices at Infosys, gleaned entirely from its annual reports. In every year from 1994 to 2001 more information relevant to corporate governance is released (with the exception of the transition from 1999 to 2000 during which time there is no change).

Why Infosys rather than other software firms?

It is worth pondering why Infosys chose to adopt these corporate governance measures, while other firms, arguably comparably exposed to global competition for products and talent, did not. We consider three classes of possible, and non-mutually exclusive, explanations in sequence: unobserved heterogeneity in type; positive externalities through a variety of means; and altruism on the part of Infosys management.

Firm asymmetries

The possibility of (possibly unobserved) heterogeneity among firms might suggest an answer. Specifically, it could be that Infosys was sufficiently different from other candidate software firms to make adoption most beneficial for it (or to make adoption least costly for it). Stated differently, consider a situation where there is an informational asymmetry between firms and customers or suppliers, and there is a separating equilibrium under which some firms find it worthwhile – presumably less costly – to adopt corporate governance and signal their type, while others do not (Spence, 1974; Blass and Yafeh, 2001). Then the proportion of firms that adopt good corporate governance procedures is determined entirely by the proportion of 'good' firms in the population.

One constraint to adopting good corporate governance is immediately identifiable for several of the other now-prominent firms in the industry. Wipro, Tata Consultancy Services (TCS), and Satyam are all part of broader business groups.²¹

Table 4 Time-series evolution of information content of Infosys’ annual reports (illustrating evolution of the kind of information available in Infosys’ annual reports over a 7-year period)

Information category	2001	2000	1999	1998	1997	1996	1995	1994
Reconciliation with US GAAP	Yes	Yes	Yes	Yes	Yes	Yes	Missing	No
Profile of projects to signal technical competence	Yes	No	No	No	No	No	Missing	No
Discussion of risks of investing	Yes	Yes	Yes	No	No	No	Missing	No
Details of options grants	Yes	Yes	Yes	Yes	Yes	No	Missing	No
Brand and intangible asset valuation	Yes	Yes	Yes	Yes	Yes	No	Missing	No
Human resource valuation	Yes	Yes	Yes	Yes	Yes	Yes	Missing	No
Reconciliation with GAAP of countries other than India and US	Yes	Yes	Yes	Yes	No	No	Missing	No
Reconciliation with recommendations of ad hoc corporate governance committees by country	Yes	Yes	Yes	No	No	No	Missing	No
Responses to frequently asked questions for shareholders	Yes	Yes	Yes	Yes	No	No	Missing	No
Honor rolls for valued employees	Yes	Yes	Yes	Yes	Yes	No	Missing	No
Letter from Directors addressed to:	Shareholders	Shareholders	Shareholders	Shareholders	Shareholders	Shareholders	Missing	Shareholders
EVA analysis	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Organizational chart	Yes	Yes	Yes	Yes	Yes	Yes	No	No

As such, their ability to reengineer their corporate governance systems may well be subject to inertia of a sort that did not apply to a professionally managed startup like Infosys.²² Note that one dimension of heterogeneity – degree of exposure to global competition – should not be over-relied on here. Infosys, while more exposed to global competition than the median Indian software firm, is not more exposed than comparably global TCS and Wipro.

A second mechanism can be sketched out whereby firms differ sufficiently in their type so that some find it worthwhile to adopt while others do not. Suppose that governance choices are made at the outset by firms when each could either have incurred expenditure to adopt good governance or could have foregone this investment possibility. Suppose further that firms expect that Indian industry will upgrade over time. In its early stages, there is commodity demand and not much benefit to good corporate governance. In later stages, demand for quality rises and benefits of good

corporate governance become more apparent. In such a world, it is possible to derive asymmetric equilibria where *ex ante* symmetric firms make different (fixed in long run) choices, that is, some take the proverbial ‘high road’ and adopt good governance and profit in later stages, while others forego good governance, and profit in earlier stages, and no firm finds it beneficial to switch given the actions of others. The difference from the signaling model earlier is that there is no uncertainty in type here, but the heterogeneity among firms is driven by long-run decisions made at the outset.

Externalities

A second class of explanation has to do with Infosys’ actions imposing positive externalities on the rest of the environment.²³ However, this class of explanations must still answer the question: Was Infosys better served by being the only (or one of a small number) well-governed company in the Indian software firmament, uniquely able, in the



eyes of global customers, talent and customers, to benefit from India's low-cost talent base? Or was Infosys better served by upgrading the corporate governance systems of other firms in India? Answers to these questions depend on Infosys' ability to capture some of the benefits of these positive externalities in one of two ways. Either the externality imposed on the environment results in a lower cost of capital for Infosys or talent is easier to attract, for example, through the diaspora community, as a result of their being a larger number of well-managed Indian software firms as potential employers.

We consider four distinct mechanisms through which these positive externalities might arise: perceptions of global customers and providers in factor markets; emergence of specialized intermediaries; resolution of uncertainty; and regulatory education.

Regarding the first of these, note the quote by Mohandas Pai, Chief Financial Officer of Infosys (Kuemmerle and Coughlin, 2000),

We have learned that you can create wealth in a legal and ethical manner. We have a ...[big] competitive advantage through our transparency. But we do not want to just simply keep it for ourselves. We want to share all our best practices with all Indian companies and will even help them implement it. That is how you create maximum value in all of India.

But Pai went further in comments to us that implied that there is a positive externality emanating from being surrounded by well-governed entities. Thus,

You are always subject to the external environment, and if you can improve it, it will serve you well. For instance, if global capital perceives India to be a great place to invest, you're obviously going to have a greater number of investors coming to India to invest. And for that, it's not good to have just one company like Infosys that has good corporate governance standards. The whole thing changing is good for India, and obviously what is good for India, is good for us. So our goal has been to work with everybody else to make a good external environment.

Second, Infosys' adoption of good corporate governance might stimulate the development of specialized intermediaries, which, in turn, will benefit other Indian software firms. For example, analysts, having been exposed to Infosys' superior disclosure practices, might demand the same from other companies. This is especially so as analyst capabilities, normally stunted in an illiquid market, themselves develop.²⁴

Third, one can make the argument that the benefits of corporate governance are uncertain and that, once Infosys adopted and the benefits became clear, others will become more willing to adopt. This has the flavor of models of herd behavior, such as those by Banerjee (1992) and by Bikhchandani *et al.* (1992), which typically rely on the revelation of some information to one party and the gradual resolution of uncertainty to drive adoption by other firms.

Finally, pressure might arise from a now-educated regulator. Thus, we were told in our interviews:

The fact that there were companies who moved forward despite the lack of regulations, made the task of creating requirements easier for regulators. Now the regulators can say, 'If some of India's leading companies can do this, so can you.' Today the implication of resistance is that you have something to hide, and that is not a risk that companies are willing to take. So as a result of companies moving ahead of regulation made: resistance to change lower & demand for change higher. Both from the point of view of users of financial information and providers of financial information, people saw what better standards looked like and they liked what they saw.

Circumstantial evidence in favor of the 'educated regulator' hypothesis is most developed, so we consider this at some length. Infosys, and Murthy in particular, has played a central role in helping diffuse good corporate governance practice. Aware of the barriers to good corporate governance, Murthy has gone out of his way to help circumvent them. Part of this effort has been through voluntary membership in various governmental and quasi-governmental bodies that play a role in such diffusion. Murthy and other senior managers played a prominent role in helping design the Securities and Exchange Board of India's (SEBI) guidelines on corporate governance. Murthy was a prominent member of the Kumar Mangalam Birla Committee on Corporate Governance. Interestingly, if one examines the constituent list of the Birla committee, other than Birla himself, there is no industrialist or representative of a company on the committee other than Murthy.²⁵ Further, Murthy has served as chairman of NASSCOMM, the prominent software industry lobbying group from 1992 to 1994, and Nandan Nilekani, one of the Infosys founders, was a founding member of NASSCOMM (Kuemmerle and Coughlin, 2000).

The various activities have resulted in some mandated diffusion of corporate governance. That is, activities by SEBI, the Birla Committee, the Confederation of Indian Industry's (CII) corporate

governance initiative – spurred along by individuals like Murthy – have institutionalized the idea that corporate governance should spread. Note the Birla committee’s assessment that, to disseminate good corporate governance, ‘a statutory rather than a voluntary code would be far more meaningful.’ (p xx). The idea was to get a critical mass of companies signing on by fiat, and then to isolate detractors and eventually shame them into adopting the standards. This was seen to be the way to get around those blocking adoption of such corporate governance standards. The phase-in of the SEBI regulations began on April 1, 2001. The top 200 companies were to have complied by this date, and more companies will have to comply each year. The 200 companies that had to comply by April represent about 80–90% of the market capitalization that is usually traded, and are the cream of corporate India.

The new SEBI guidelines mandate changes in two broad areas. First, there are proposed amendments to the board structure. In particular, the SEBI guidelines suggest that the board have more independent directors and an audit committee. The second broad area of improvement that is mandated is improvement in the accounting standards. This is somewhat tricky, since, unlike the US. SEC, SEBI does not have direct oversight over the accounting industry. SEBI has thus left it up to the accounting body to set standards closer to

international norms. It has also said that it would enforce some of these standards through modifications on currently lax listing requirements. Among the modifications to existing accounting practices are the following: Consolidation of accounts; Disclosing accounting results by business segment and geographic segment; Deferred tax accounting; and Related party disclosures, especially to enforce the rights of the minority shareholder.

Another area where regulatory changes played a role was in the adoption of employee stock options. Till recently, Indian laws prohibited the granting of stock options to employees, limiting companies’ ability to align the incentives of employees with shareholders. The software industry was the first industry to be granted an exception to the rule, thanks in part to the lobbying efforts of the software industry association NASSCOMM. Once this practice became widespread in the software industry, other companies began facing pressure in the labor market. As a result of lobbying by these companies, the Indian government recently changed the law, making it possible for all companies to grant employee stock options. Several large companies began to adopt this practice, even though the practice is currently far from being wide spread among Indian companies.

Figure 1 provides a schematic showing the (hypothesized) inter-relationships between some of these positive externality mechanisms.

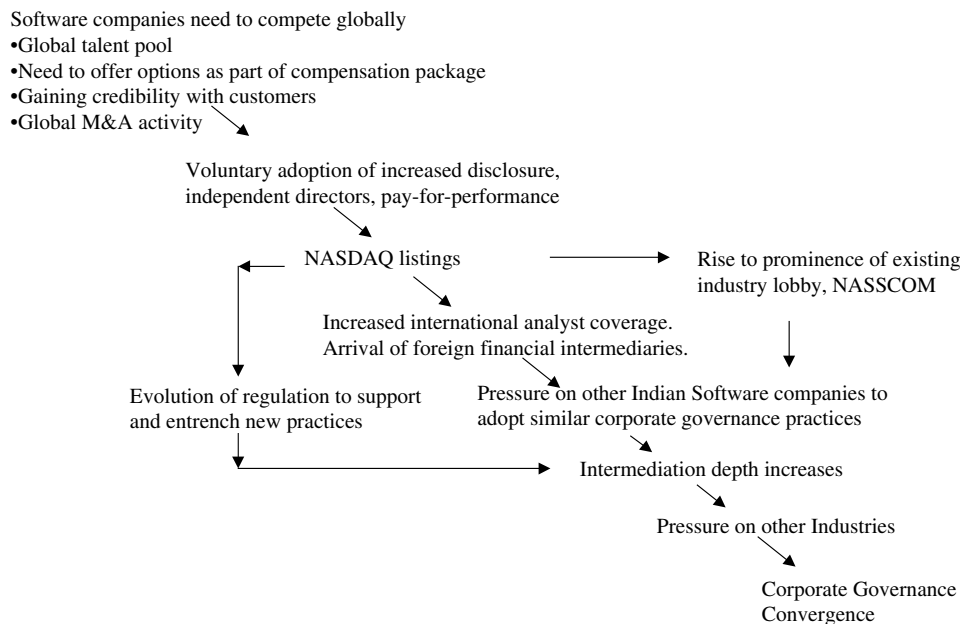


Figure 1 A schematic of the effects of Infosys corporate governance initiatives. This figure demonstrates hypothesized effects of Infosys’ actions on Indian financial markets and on other Indian firms’ corporate governance practices.

Altruism

Spillover benefits of the sort considered above appear to our intuition to be likely to be realized over the longer term. It is worth considering the possibility that some other (temporally) proximate factor might have induced Infosys to undertake the costs of engaging in corporate governance reform even though it realized that other (possibly competing) firms might free-ride off its efforts.

A candidate factor is suggested by Murthy's ideology, much discussed in the media, perhaps partly because his famously spartan lifestyle conflicts in peoples' minds with his new-found wealth. (This is, of course, one type of heterogeneity between Infosys and other firms – see Firm asymmetries above.) As he says, 'I believe that change happens, not because of many people, but because one person starts to think and act differently.' A related statement from SEBI member Jayanth Verma is worth quoting here

In every economy there are idealists. The interesting question is – In what type of economic environment do these ideals translate to practices that are economically significant and profitable. Perhaps in a different environment Murthy would have been a curiosity rather than the head of one of India's most valuable companies. There are some people who are honest because it is a good policy, or it is rewarded. But the people who start the ball rolling are honest because they are honest.

Murthy also assigns some importance to a work stint in Paris during his formative, and pre-Infosys, years. He avers that exposure to socialism in Paris convinced him that wealth creation rather than wealth distribution was the way forward (Kuemerle and Coughlin, 2000). Of course, the underlying interest in the well being of others might well have enticed him to spread corporate governance regardless of the economic implications of such actions for Infosys.

We develop here a simple economic model that clarifies a possible role played by Murthy's ideology in Infosys' decision to adopt costly corporate governance mechanisms, even with the knowledge of the possible free riding that would ensue by other firms. The model also assigns primacy to the role that Infosys and the software association played in educating the regulator regarding corporate governance.

To rule out the possibility that our model is driven by some of the factors highlighted earlier as possible causes of Infosys' adoption – such as unobserved heterogeneity among firms or the resolution of uncertainty – we specify a model in

which there are (two) symmetric firms and in which outcomes are certain. The only asymmetry is that firm 1 (to be thought of as Infosys) moves first and firm 2 follows.²⁶ Firm 1 has to decide whether to incur fixed costs of F to adopt good corporate governance practices, in which case its marginal costs fall from c to 0. Here F is an abstraction for the numerous and costly procedures that the firm must undertake to improve disclosure, and the cost of seeking independent directors and reformulating its board, etc. Similarly, c is an abstraction for the reduction in costs of seeking either capital or talent once good governance is adopted.

Subsequently, and contingent on firm 1's decision, firm 2 makes the same decision. In the final period of the game, both firms compete in quantities with the inverse demand function given by $P=1-q_1-q_2$, where the subscripts refer to firm identities.²⁷ We assume $c < 1$ to ensure interior solutions and look for pure-strategy subgame-perfect Nash equilibria (hereafter, SPNE) in this simple model. The analytical strategy is to first consider outcomes in the simple game, and then to sequentially modify the game to account for altruism on the part of firm 1 and learning on the part of the (unmodeled) regulator.

The game tree with payoffs for each branch is shown in Figure 2. The first payoff in the parentheses at each node corresponds to firm 1's payoffs and the second to firm 2's. The tree does not show the fixed costs, which are incurred by the firms if they choose to implement corporate governance. We use the notation ij to represent the decisions by

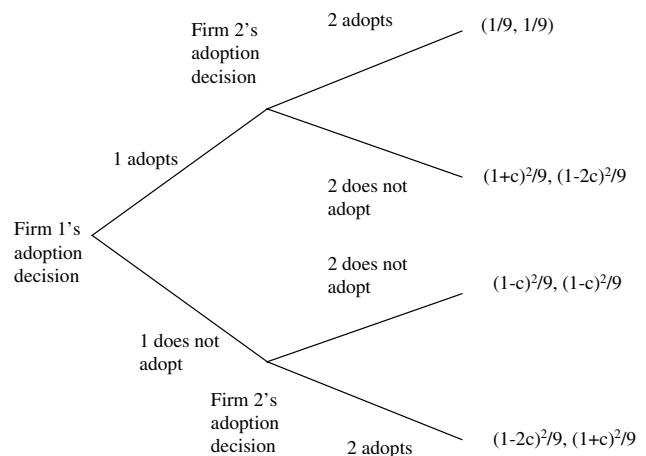


Figure 2 Game tree for the simple model. This figure illustrates the sequence of moves and payoffs for each of the players in the simple model described in the text.

firms, where $i \in \{1, 2\}$ denotes the firm in question and $j \in \{y, n\}$ corresponds to 'adopt corporate governance' and 'do not adopt corporate governance', respectively. Thus, $\{1y, 2y\}$ corresponds to each of firms 1 and 2 adopting corporate governance practices. We describe the equilibria and the underlying intuition here, and relegate the (elementary) proofs to Appendix A1.

Proposition 1 (Simple Model). *For $F < 4c(1-c)/9$, $\{1y, 2y\}$ is the only pure strategy SPNE. For F in $[4c(1-c)/9, 4c/9]$, $\{1y, 2n\}$ and $\{1n, 2y\}$ can each be a SPNE. For $F > 4c/9$, $\{1n, 2n\}$ is the only pure strategy SPNE.*

The simple model does not admit of both firms adopting $\{1y, 2y\}$ as an SPNE. The intuition is as follows. When F is small enough, relative to the benefits received, which are increasing in c , it makes sense for both firms to adopt. When F is large enough, neither firm adopts. The intermediate range is more interesting. Here it makes sense for only one firm to incur the costs of adopting. This is because, once a firm adopts, it lowers its marginal costs and can produce more. Since quantities are strategic substitutes (Bulow *et al.*, 1985), over-production by the adopting firm induces the other to produce less. The negative externality is sufficient in this range to make it uneconomical for the other firm to incur the fixed costs of adoption.

We now consider the following modification to incorporate the idea that the first firm to adopt helps the regulator devise procedures that facilitate subsequent adoption by other firms. We model this by the simple device of assuming that, if 1 adopts, 2 does not incur fixed costs F of adoption.

Proposition 2 (Regulator Learning). *For $F < 4c(1-c)/9$, $\{1y, 2y\}$ is the only pure strategy SPNE. For F in $[4c(1-c)/9, 4c/9]$, $\{1n, 2y\}$ is the only pure strategy SPNE. For $F > 4c/9$, $\{1n, 2n\}$ is the only pure strategy SPNE.*

The outcome turns out not to be too different from the simple model. Part of the intuition is that the first firm knows that it is facilitating the adoption of governance by the second firm. It realizes that it will not be in as good a position to recoup its fixed cost investment (as it would be if the other firm, having to incur costs F , desisted from the adoption). Consequently, it is less likely to adopt in the first instance.

We then consider an alternative modification to the simple model. One way of capturing the idea of

altruism on the part of firm 1 is to model firm 1's utility as driven not just by its own profits but by those of firm 2 as well.²⁸ Firm 2 continues to be modeled as a conventional profit maximizer.

Proposition 3 (Altruism). *For $F < \min[c(1-c), c(2-c)/4]$, $\{1n, 2y\}$ is the only pure strategy SPNE. For F in $[\min[c(1-c), c(2-c)/4], \max[c(1-c), c(2-c)/4]]$, $\{1y, 2n\}$ or $\{1n, 2n\}$ are possible SPNE. For $F > \max[c(1-c), c(2-c)/4]$ $\{1n, 2n\}$ is the only pure strategy SPNE.*

There are substantial differences in outcome relative to the simple model. Even when F is small enough, firm 1 does not adopt. It does not find it useful to incur the fixed costs twice in effect, since it derives sufficient utility from the fact that firm 2 will adopt if it does not and from the resulting profits that firm 2 earns in equilibrium. Note that even with altruism, there is no pure strategy SPNE where firms 1 and 2 adopt.

Finally, we consider a model with both regulator learning and altruism. Firm 1's utility is given, as before, by the sum of profits of firms 1 and 2, and firm 2 incurs no fixed costs of adoption if firm 1 has adopted before it.

Proposition 4 (Regulator Learning and Altruism). *For $F < 2(2-c)/4$, $\{1y, 2y\}$ and $\{1n, 2y\}$ are pure strategy SPNE. For $F > 2(2-c)/4$, $\{1n, 2n\}$ is the only pure strategy SPNE.*

This set of assumptions yields the broadest range of values of F for which $\{1y, 2y\}$ is a pure strategy SPNE. Relative to the regulator learning without altruism model, the intuition here is that the first firm internalizes the negative externality imposed by the second firm's adoption on itself. Altruism thus induces it to adopt even though its own profits will be reduced by firm 2's adoption.

Graphically, the range of outcomes under the various model assumptions is depicted in Figure 3. For each case, we indicate the pure strategy SPNE for a variety of ranges of F , with the ranges expressed in terms of ' c '.

The model helps us demonstrate a logically consistent set of assumptions under which both firm 1, Infosys, will adopt corporate governance and will take steps that facilitate firm 2's adoption of similar practices. Our interpretation is that, indeed, it is the interplay between altruism and regulatory learning that provides an important part of the answer to the two questions posed at the beginning of this section.

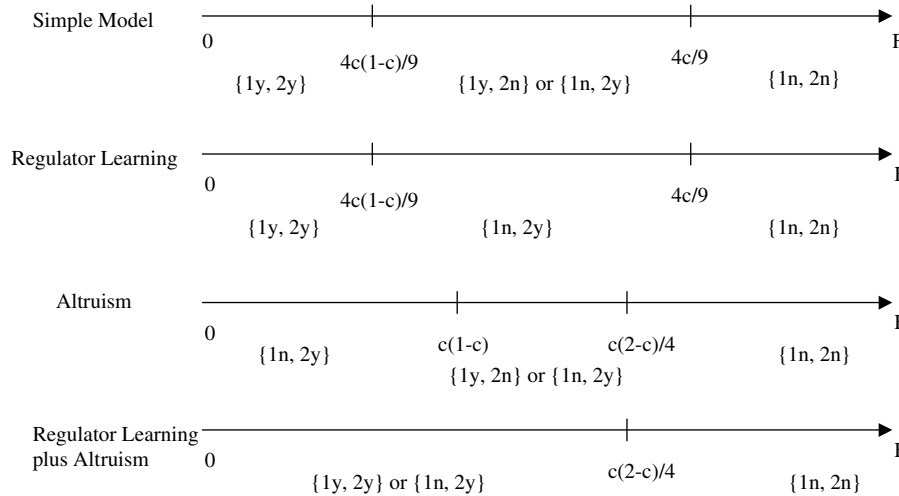


Figure 3 Solving the game. This figure illustrates equilibrium outcomes for the simple game and for the several variants of the game considered in the text.

In summary, it is unlikely that capital market pressures forced Infosys to adopt good corporate governance practices. Infosys was less pressured in this sense than firms in other industries, since software is not as capital intensive as many other industries, and also less pressured than other software companies. It is at least plausible that competition for talent and in the product market induced such adoption, a conclusion also borne out recently in Khanna *et al.* (2004) large sample analysis of foreign firms with commercial (product or factor market)_links to the US. Finally, the reasons that we present for adoption are not mutually exclusive. In particular, there may be other drivers of adoption of good practices that are unobserved by the researcher (or hard to measure by her). We have clarified how one such attribute (altruism) might play out in the context of ambient regulatory learning.

The limits of globalization in causing convergence in corporate governance

Our focus on the Indian software industry, and on Infosys in particular, runs the risk of overestimating the likely effect of globalization on convergence in corporate governance. However, there are a few pieces of evidence that we can present that suggest that globalization, whether of the product, talent or capital markets, has limited effects on the corporate governance convergence in the aggregate.

The first is based on the observation that there is wide variation, even within the Indian software industry, of the extent to which various firms

are regarded as well governed. Some of this was previewed in the comparison between Infosys and Wipro, the latter regarded as a leading software firm. But even this comparison understates the differences since there are many software firms in India that are regarded as poorly governed. Some summary data from CLSA, which we alluded to earlier, corroborates this impressionistic statement. While Infosys and Wipro have ratings of 93.3 and 80.2, respectively, out of a possible maximum of 100, other software firms fare considerably worse, with the lowest rating (among Indian software firms) of 40.2 given to Silverline. Indeed, the standard deviation of the corporate governance ratings is much higher for the software industry than for other industries for which we have similar numbers of observations (Biotechnology & Drugs and Commercial Banks, for example).

Larger sample econometric work also points to the same conclusion. In companion work using several data sets on corporate governance indicators around the world (including the Credit Lyonnais data alluded to above), we find little evidence of positive correlation between exposure to either global product or global capital markets and adoption by large firms of US-style shareholder governance practices. We do find that exposure to global talent markets is positively (and statistically significantly) correlated with the adoption of such practices, although the effect is rather small. We also conduct a simple exercise where we ask how much of the variation in corporate governance indicators is explained by industry effects vs country effects. The overwhelming conclusion,

robust across all data sets, is that country effects explain far more of the variation than do industry effects. If we accept the plausible assumption that globalization is likely to occur along industry lines, it follows that there is not much convergence in either form or function.²⁹

Finally, there are numerous anecdotal examples of circumstances wherein firms that were exposed to global product markets have not adopted US-style governance measures. Japanese and Korean firms in their heyday are examples of this phenomenon.³⁰

We therefore devote the remainder of this section to outlining several factors that might prevent convergence in corporate governance occurring as a result of exposure to global competition. The first of these is to note that the 'signaling of quality' story presented earlier itself suggests some limit to convergence. Poor quality firms will simply not find it worthwhile to adopt good corporate governance in a separating equilibrium.

A second factor is to note the possibility that there are, in fact, limited spillover effects between the software industry and the domestic economy. Ghemawat and Patlibandla (1999) argue, for instance, that the software industry is a well-functioning island in an otherwise inefficient sea. Indeed, the Indian software industry is efficient partly because it is insulated from other industries and more connected to the global economy. Thus, unless a firm in some other industry is directly exposed to global competition, there will be limited influence of globalization *through* the software industry channel.

Third, globalization might not be strong enough to overcome vested interests' ability to block change. For example, incumbent, often family-owned and controlled, companies may perceive it to be in their (explicit or implicit) interest to block the development of markets. It might be of explicit interest if, for example, their advantage is based on preferential access to local factors, including political patronage (Olson, 1965; Fisman, 2001). It may be of implicit interest if, for example, their very refusal to adopt good corporate governance is strong enough to retard market development, an example of the path-dependence discussed by Bebchuk and Roe (1999). For a possible way in which this might happen consider that the equity of old, family-owned companies does not generally trade. So there is only limited reason for the quality and depth of financial intermediation to improve over time. This further reinforces the costs

of raising external capital, which, in turn, ensures that family control persists.³¹

Finally, it may be that US-style corporate governance is less applicable to emerging markets. We develop this idea briefly in the next few paragraphs. Consider that modern conventional wisdom suggests that maximizing returns to shareholders is the most sensible role for corporate governance. The usual reasoning is that shareholders are uniquely deserving of protection because other stakeholders, notably labor, have the means to protect themselves (Shleifer and Vishny, 1997). Departures from this point of view effectively maintain that shareholders can impose negative externalities on other stakeholders and the latter do not necessarily have the means to protect themselves.³² Tirole (2001) captures this conflict by describing the stakeholder view of corporate governance as encompassing both the idea that management should maximize the sum (utilitarian view) of utilities of all stakeholders, and the idea that there might be divided control, that is, divided between shareholders and other stakeholders.

How should this discussion be modified to suit the realities of an emerging market like India? First, the idea that labor can protect itself against expropriation by shareholders is less plausible in such a country for several reasons. The prospect of controlling shareholders reaping private benefits from companies that they control is vast. Further, the court system does not function well enough to check this. Finally, the absence of smoothly functioning markets for human capital imply that exploited talent cannot simply vote with its feet in the face of shareholder-induced adversity. For all these reasons, a plausible case can be made that corporate governance should be sensitive to the interests of more than just shareholders.

Further, another usual argument – that of tractability – that usually operates in favor of shareholder-based governance is weaker in emerging markets. Tirole (2001) argues, for example, that one cannot divine explicit incentives for managers, which are based on some observable and readily measurable measure of aggregate welfare of stakeholders. The value of various relationships that the firm engages in are not generally observable on well-functioning markets, whereas relationships with shareholders generally are. However, this last statement – having to do with the ease of devising a metric of welfare of shareholders – is less true in poorly functioning capital markets in emerging economies. *Ceteris paribus*, this tilts us more to the



side of stakeholder governance in much of corporate India than it would in an economy with well-functioning capital markets.³³

Software may be an exception to this reasoning partly because the global talent markets imply that labor does have the option to vote with its feet, as it were, if its wages are unsatisfactory. SEBI member Verma explains,

The software industry was uniquely positioned because it interacted with a very large number of stakeholders who were accustomed to higher standards of transparency; not just investors but customers and even in many ways their employees. The employees were knowledge workers who were more demanding and a much higher percentage of employees who had a choice of where to go. The typical type of industrial worker probably does not have the same kind of mobility both within the country and outside, as the knowledge worker does. The balance of power in the software industry (or in a knowledge industry) is far less heavily loaded in favor of the organization as it is in the traditional industries. This is true of the customer base as well. When you are selling services to the global Fortune 500, they obviously have their choice of sources/service providers from all around the world.

Further the power of talent may not be confined just to the software industry. Kapur and Ramamurti (2001, 10) say that there are other Indian industries where global competition endows talent with power – they include media, biotechnology and pharmaceuticals and industries like accounting services and credit card processing, medical transcriptions and call-centers. Bhuvanesh Singh, analyst at Credit Suisse First Boston, suggested that ‘SEBI was a bigger catalyst in terms of governance standards for companies outside of the IT sector.’ The implication is that Infosys’ governance practices might naturally, or with Murthy’s help, have spread within the information technology sector. However, global forces were insufficient, in and of themselves, to ensure good corporate governance in other sectors in the economy. For this purpose, the analyst opined that the regulators needed to be co-opted for diffusion to occur. The argument, then, is that the sort of shareholder-centered governance brought to India by Infosys will be applicable in some sectors exposed to global competition, but probably not more broadly to other parts of the economy.

Indeed, Indian regulators have struggled with this issue. The Report of the Kumar Mangalam Birla Committee on Corporate Governance has the following to say regarding the stakeholder vs shareholder-centric view of corporate governance. The committee’s objective (Item 2.6) was to devise

a code that could draw on the work done by international bodies that preceded it but to prepare a code to ‘suit the Indian corporate environment, as corporate governance frameworks are not exportable.’³⁴ Ultimately, the committee does not take a hard line. Item 4.2 of the report says that ‘the fundamental objective of corporate governance is the ‘enhancement of shareholder value, keeping in view the interests of other stakeholders.’ This is consistent with the idea that shareholder-style governance may have some, but not universal, applicability in India’s emerging market setting.

We acknowledge that we have circumvented the issue of whether or not Infosys’ specific corporate governance practices are the reason for its superior performance. It may be that the diffusion of such practices has not happened because the performance effects attributable to these specific practices are small. That is, there are functionally equivalent ways of protecting resource providers that others have adopted. In partial support of this idea, Khanna and Palepu (2003) show that business-group launched software firms, with different corporate governance practices, do not perform ambiguously more poorly than do firms with the more conventional governance practices.

Conclusion

Does product and labor market globalization cause convergence in corporate governance? Our case analysis suggests that the answer to this question is a ‘constrained yes.’ A summary of our interpretation of the case follows.

Software firms’, and especially Infosys’, exposure to global product markets, first, and then to global talent markets, seems to have driven some adoption of shareholder-style corporate governance in India. In contrast to the stance taken by the existing literature on the convergence of corporate governance, we do not find much of a role for capital markets as drivers of this process. If anything, Infosys and some other Indian software firms accessed global capital markets long after their exposure to global product and global talent markets had driven them to adopt good corporate governance practices.

Infosys may have chosen to be a lead adopter of such practices in India for several reasons that we analyze – as a signal of its high quality, to benefit indirectly from positive externalities that its adoption decision had on other software firms in India, or as a consequence of Infosys’ CEO’s ideological bent. We discuss how this latter reason results in a

pro-active role taken by a coalition of firms in 'educating the regulators' in how good corporate governance should be adopted.

However, the Infosys success story and its efforts at regulatory education notwithstanding, there is only limited diffusion of such practices to other firms in the software industry and to other firms in India. We explore several reasons why, in practice, the effects of globalization on corporate governance convergence are somewhat limited.

It is possible that the effects of adoption decisions taken by Infosys, by other leading software firms, and by other leading firms in global industries in India, are only just beginning to be felt.³⁵ Perhaps the conclusion of limited diffusion (along the lines sketched out in Figure 1) is premature. In ongoing work, we are hand-collecting large sample data to shed light on both a positive and a normative question. The positive question has to do with quantifying various barriers to the diffusion of US style corporate governance. The normative question has to do with the extent to which such practices *should* diffuse in the emerging market context of India.

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Notes

¹See, for example, Krishna and Khozem (2000).

²Bhidé (1993) points out that there are pros and cons to a financial system with dispersed shareholdings. Such a system encourages an active external market for corporate control, and thus can foster good governance. On the other hand, the lack of a large block shareholder who can internalize the externalities inherent in providing monitoring services also means that shareholders will not actively engage in internal monitoring, but will choose to vote with their feet. Thus, there are tradeoffs inherent in different systems of corporate governance.

³Kaplan (1994) has provided some econometric evidence of this for a particular aspect of corporate governance. Statistically, poorly performing CEOs appear equally likely to be dismissed in the US, Germany and Japan, despite the very different formal systems in place.

⁴As an example, Tiger Fund forced SK Ttelecom, a Korean firm belonging to the SK Group (chaebol) of companies, to abandon shareholder unfriendly practices.

⁵Israel provides an example of such a sorting mechanism (Blass and Yafeh, 2001). The burgeoning number of global capital issues also suggests the importance of this issue (Karolyi, 1998). Of course, the flight of high-quality issuers might have the opposite effect of causing a degeneration, or hollowing-out, of the local capital market. Such concerns have been expressed, for instance, in South Africa recently, as well as in Mexico (Moel, 1999).

⁶Indian industry has generally played only a very small role in other large parts of the global software industry, such as packaged software. We eschew discussion of these parts of the industry for brevity. Also, we focus on export markets, rather than on the domestic Indian software market, since our interest is in global competition in this paper.

⁷It may be that quality concerns are greater when a firm is located in an environment with a reputation for poor governance and poor quality products. Perhaps US firms do not find it necessary to seek certification of this sort.

⁸Of course, portfolio investment into India has occurred in parallel, with some increase following India's 1991 liberalization.

⁹This section draws extensively from Khanna and Palepu (2000).

¹⁰Two recent corporate governance disasters indicate the state of affairs in 2001. The celebrated Ketan Parekh scandal, named after the protagonist broker, involves banks lending money to unscrupulous entrepreneurs to invest in, and thereby exacerbate, India's



information technology-led stock market bubble, with ultimately disastrous consequences. The second has to do with the failure of the Unit Trust of India, the state-run mutual fund in which tens of millions of Indians have their life-savings invested, and its unprecedented 'repurchase freeze' which prevents savers from redeeming their savings. The Ministry of Finance has endured heavy criticism for its inept handling of the UTI affair, especially since problems at the fund were apparent and discussed in the country's Parliament and in the media in 1994 and 1998. The situation is perhaps best summarized by the scathing critique issued by ex-Finance Minister Manmohan Singh, the architect of India's 1991 reforms, 'First and foremost, we need to improve the quality of governance in this country. Making a mockery of the system, not enforcing the law, letting respective state governments play havoc with law and order, having non-uniformity in implementation of law depending on the status of the persons involved and letting loose an era of extortions either through direct ransom or through bribery in every field of life, including the judiciary, have played havoc on the minds of people' (*Business India*, August 6–19, 2001, 48).

¹¹In 1993–1994, many firms issued preferential equity allotments to the controlling shareholders at steeply discounted prices.

¹²A detailed account can be found in SEBI (1994). The need to transact physically imposes limits on trading volumes and on the speed at which orders can be handled. With the open outcry system (as opposed to screen-based trading), it is difficult to establish audit trails. There were no depositories, making settlement difficult (and no legislative means to establish depositories). Trades were often consummated outside the exchange. This left a lot of room for manipulation, with cases of fraud becoming legion.

¹³However, there is no statistically significant difference between software and non-software firms in the proportion of equity held by institutional investors.

¹⁴Note that Wipro had a stock ownership plan for senior employees dating back to the mid-1980s.

¹⁵It is prudent to point out the possibility of reverse causality in our reasoning regarding why Infosys adopted good corporate governance practices. While we reason that good corporate governance yielded factor market advantages that helped Infosys succeed, it could be that Infosys succeeded for reasons unrelated to corporate governance, and subsequently chose to invest available resources in adopting new practices. At a minimum, given the talent that flocks to Infosys in the domestic Indian labor markets, it is

implausible, in our opinion, that this reverse causality captures reality entirely.

¹⁶Relatedly note that Azim Premji, CEO of another leading Indian software company, Wipro, lists the following reasons for his company's recent NYSE listing: (1) obtain acquisition currency, (2) retain talent, (3) strengthen brand and credibility and (4) impose discipline on organization (Ramamurti, 2000). This list of reasons assigns only partial importance to capital market factors.

¹⁷We lack original data to make this point persuasively. Note, however, that Infosys was judged 'India's Best Employer' by the first Business Today-Hewitt Survey conducted in December of 2000. (*Business Today* is one of India's leading business magazines.)

¹⁸Indeed, it is possible to overstate this distinction between globalization of capital vs other kinds of markets. For instance, should listing overseas to be able to issue dollar-denominated options to talent be classified as a capital market effect or one caused by exposure to global talent markets? We are conscious of this difficulty, but nonetheless concur with observers at Infosys that access to capital, in some intuitive sense, is not the driver of adoption of several of these corporate governance practices.

¹⁹Botosan (1997) constructs a disclosure index for a sample of US companies by similarly examining a more comprehensive (but also ultimately *ad hoc*) set of indicators in annual reports, and shows these to be related to the cost of the firm's equity capital.

²⁰Theoretical work on the effect of competition on disclosure investigates whether mandatory disclosure (regulatory fiat) is necessary in the face of competition, and how disclosure varies with the nature of competition and with the degree of information asymmetry between managers and economic agents outside the firm. See, for example, Verrecchia (1983), Dye (1985) and Darrough (1993).

²¹Business groups are collections of legally independent firms, typically diversified across a range of industries, often controlled by a single family. The firms in a group are linked by several formal and informal ties. Arguments can be made both in favor of, and against, the idea that groups would adopt better governance techniques (Khanna, 2000). Here, a possible rationalization of Infosys adopting good corporate governance, and some group affiliated software firms not doing so, is as follows. Groups had access to other sources of factor inputs and did not need to rely on external markets – hence did not feel governance pressures to the same extent.

²²Lest these business groups are tarred with too broad a brush, note that TCS is, by most accounts,



credited with 'starting' the Indian software industry. In the wake of IBM's exit from India, it took the reputation and resources of India's preeminent and reputable business group, the House of Tata, to create a startup in the software space to partially fill the void left by IBM. It is hard to see how a *de novo* entrepreneur – such as Infosys – could have done this at the time. Khanna and Palepu (2003) discuss the historical evolution of the Indian software industry.

²³For a broader discussion of the software industry's effect on India, see Arora and Athreye (2001).

²⁴A similar dynamic was observed in Chile (Khanna and Wu, 1998) following Compañía de Teléfonos de Chile's (CTC) first issuance of an American Depositary Receipt (ADR) in Chile in 1990. Domestic intermediation developed considerably thereafter in a way that practitioners in Chile's financial markets opine is at least partly causally related to the foreign listings of CTC and others that followed it.

²⁵Such other businessmen as are present on the committee are there in different capacities, as representatives of other bodies. Other members of the committees are not industrialists *per se* but members of intermediaries responsible for the implementation of corporate governance – such as accountants, auditors, consultants and government representatives.

²⁶This is an important asymmetry because we are interested in the diffusion of governance from Infosys to other firms. A simultaneous move game does not capture this. We do not model a production stage between firm 1's adoption decision and firm 2's. This biases us away from deriving a conclusion where firm 1 adopts, since firm 1 would benefit from its superior governance (relative to firm 2) in this interval.

²⁷Admittedly, there is nothing particular to the software industry in the way in which we set up the model. The model investigates the adoption decisions of any set of competing firms, and abstracts from the across-industry diffusion part of the Indian story.

²⁸Such an objective function for Infosys is implicitly motivated by two assumptions – first, that Murthy derives some utility from such altruism, and, second, that he exercises sufficient influence on the firm for this to be modeled as affecting the firm's objective function. Public information suggests that each of these assumptions is not without foundation. Economists have not made much progress on modeling

altruism, although see Akerlof and Kranton (2000) for a recent related attempt.

²⁹The companion work is with Joe Kogan (Khanna et al., 2001). The finding of the importance of country effects does not, however, imply that convergence might not occur in selected industries, like software.

³⁰We are grateful to Fred Hu of Goldman Sachs Asia for this observation.

³¹Further, since state-run enterprises are notoriously inefficient, and restructuring them involves politically unpalatable job losses, these cannot provide a fillip to the development of market intermediaries.

³²In their analysis of German co-determination, for example, Gorton and Schmidt (2000) show that, when labor has control rights, it affects the objective function of the firm, suggesting that labor did not see itself as adequately protected when it did not have control rights. They also show that the interests of labor are often not aligned with those of shareholders, setting up the possibility of there being a negative externality if either labor or capital controlled the firm.

³³Berglöf and von Thadden (1999) also argue that corporate governance in developing countries should reflect broader considerations than simply shareholder value maximization. Of course, this does not undercut the observation that designing corporate governance systems that respond to stakeholder welfare is indeed hard. Tirole (2001) suggests that the best one might do in some circumstances is to hire an idealist, uniquely motivated to be honest. Indeed, Murthy appears to be just such a man.

³⁴Existing reports included Cadbury Committee in the UK, OECD Code on Corporate Governance, The Blue Ribbon Committee on Corporate Governance in the US, Report of the Greenbury committee, Combined code of the London Stock Exchange, and the Confederation of Indian Industries' Code of Corporate Governance.

³⁵Note also that perhaps the bigger and longer-term effect that Narayan Murthy's stance and actions will have on the Indian private sector is through his, perhaps inadvertently assumed, role as an exemplar of entrepreneurship in an economy where cynicism about business ineffectiveness and bureaucratic strangleholds were rife. We do not develop this notion here further, as it is somewhat outside this paper's purview.

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Appendix A1

Proof of Proposition 1 (Simple Model). The payoffs of each node of the game tree in the text of the paper are given by the simple optimization of each firm. Thus, when firms 1 and 2 produce q_1 and q_2 , and the inverse demand function is $p=1-q_1-q_2$, firm i maximizes $\pi_i=(1-q_i-q_j-c_i)q_i$. For the $\{1y, 2y\}$ branch, $c_1=c_2=0$ and each firm incurs fixed cost F , for the $\{1y, 2n\}$ branch, firm 1 spends F and $c_1=0$, $c_2=c$, for the $\{1n, 2y\}$ branch, firm 2 spends F and $c_1=c$, $c_2=0$, and for the $\{1n, 2n\}$ branch, no fixed costs are incurred and $c_1=c_2=c$. Assuming $c < 1$ guarantees interior solutions.

We search for pure strategy SPNE by backwards induction.

Consider firm 2's decision first:

If $\{1y\}$, $\{2y\}$ iff $(1-2c)^2/3 < 1/9 - F$, or $F < 4c(1-c)/9$.

If $\{1n\}$, $\{2y\}$ iff $(1+c)^2/9 - F > (1-c)^2/9$, or $F < 4c/9$.

Therefore, there are three interesting ranges of F to consider for firm 1's decision.

Let $F < 4c(1-c)/9$:

{1y} iff $1/9 - F > (1-2c)^2/9$, or $F < 4c(1-c)/9$, which is true.

In this range F is small enough that {1y, 2y} results.

Let $F > 4c/9$:

{1y} iff $(1+c)^2/9 - F > (1-c)^2/9$, or $F < 4c/9$, which cannot be true.

In this range F is large enough that {1n, 2n} results.

Let $F \in [4c(1-c)/9, 4c/9]$:

{1y} iff $(1+c)^2/9 - F > (1-2c)^2/9$, or $F < 3c(2-c)/9$.

For $c < 2/3$, $3c(2-c)/9 > 4c/9$, and so {1y, 2n} results.

For $c > 2/3$, $3c(2-c)/9 \in [4c(1-c)/9, 4c/9]$, so outcome depends on exact value of F .

For $F \in [4c(1-c)/9, 3c(2-c)/9]$, {1y, 2n} results.

For $F \in [3c(2-c)/9, 4c/9]$, {1n, 2y} results.

Hence the result. □

Proof of Proposition 2 (Regulator Learning). Since regulator learning does not affect marginal costs of production, by assumption, the optimal quantities chosen at each node of the game tree are unchanged. We have only to factor in firm 1's decision to incur the fixed costs, knowing that firm 2's fixed costs will subsequently be zero if it does, and firm 2's decision to incur the fixed costs if firm 1 chooses not to.

Proceed by backwards induction as before.

If {1y}, {2y} iff $1/9 - 0 > (1-2c)^2/9$, which is always true.

If {1n}, {2y} iff $(1+c)^2/9 - F > (1-c)^2/9$, or $F < 4c/9$.

Therefore, there are two interesting ranges of F to consider for firm 1's decision.

Let $F < 4c/9$:

{1y} iff $1/9 - F > (1-2c)^2/9$, or $F < 4c(1-c)/9$.

For $F < 4c(1-c)/9$, {1y, 2y} results.

For $F \in [4c(1-c)/9, 4c/9]$, {1n, 2y} results.

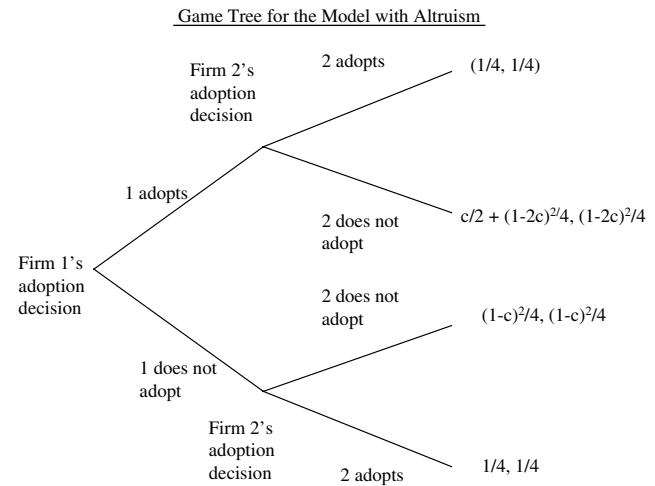
Let $F > 4c/9$:

{1y} iff $1/9 - F > (1-c)^2/9$, or $F < c(2-c)/9$, which cannot hold when $F > 4c/9$.

So {1n, 2n} results.

Hence the result. □

Proof of Proposition 3 (Altruism). Here the payoffs on the nodes of the game tree must be modified for the different objective function of firm 1. Firm 1 maximizes $\pi_1 = (1-q_1-q_2-c_1)q_1 + (1-q_1-q_2-c_2)q_2$, while firm 2 continues to maximize $\pi_2 = (1-q_1-q_2-c_2)q_2$. The tree below shows the equilibrium payoffs for each node.



As in the earlier proofs, consider firm 2's decision first.

If {1y}, {2y} iff $1/4 - F > (1-2c)^2/4$, or $F < c(1-c)$.

If {1n}, {2y} iff $1/4 - F > (1-c)^2/4$, or $F < c(2-c)/4$.

There are two cases to consider for firm 1's decision.

Case 1: $c < 2/3$ (for these values, $c(1-c) > c(2-c)/4$).

Let $F < c(2-c)/4$:

{1y} iff $1/4 - F - F > 1/4 - F$, which cannot be true.

So {1n, 2y} results.

Let $F \in [c(2-c)/4, c(1-c)]$:

{1y} iff $1/4 - F - F > (1-c)^2/4$, or $F < c(2-c)/8$, which is not possible.

So {1n, 2n} results.

Let $F > c(1-c)$:

{1y} iff $c/2 + (1-2c)^2/4 - F > (1-c)^2/4$, or $F < c/2/4$.

This turns out not to be possible in the case where $c < 2/3$. So {1n, 2n} results.

Case 2: $c > 2/3$ (for these values, $c(2-c)/4 > c(1-c)$).

Let $F < c(1-c)$:

Exactly as in the above case, {1n, 2n} results.

Let $F \in [c(1-c), c(2-c)/4]$:

{1y} iff $c/2 + (1-2c)^2/4 - F > 1/4 - F$, which turns out to be true for all $c > 1/2$

So {1y, 2n} results.

Let $F > c(2-c)/4$:

Exactly as before {1y} iff $F < c/2/4$. But this is only true when $c > 1$, which is ruled out by the assumption needed for interior solutions. So {1n, 2n} results.

Combining the cases, we have:

$F < \min[c(1-c), c(2-c)/4]$: {1n, 2y}.

$F \in [\min[c(1-c), c(2-c)/4], \max[c(1-c), c(2-c)/4]]$: {1n, 2n} or {1y, 2n}.

$F > \max[c(1-c), c(2-c)/4]$: {1n, 2n}.

Hence the result. □

Proof of Proposition 4 (*Regulator Learning and Altruism*). Here the payoffs from the altruism game tree in Proposition 3 apply. In addition, as in Proposition 2, firm 1's incurring of fixed costs ensure that firm 2 does not have to incur these costs. We proceed by backwards induction as before, considering firm 2's decision first.

If $\{1y\}$, $\{2y\}$ iff $1/4 > (1-2c)^2/4$, which is always true. So $\{1y, 2y\}$ results.

If $\{1n\}$, $\{2y\}$ iff $1/4 - F > (1-c)^2/4$, or $F < c(2-c)/4$.

So consider two cases implied by this threshold.

Let $F < c(2-c)/4$:

$\{1y\}$ iff $1/4 - F > 1/4 - F$. (Here the $-F$ term on RHS is what firm 2 spends if $\{1n\}$, which enters 1's utility.) So 1 is indifferent. Either $\{1n, 2y\}$ or $\{1y, 2y\}$ results.

Let $F > c(2-c)/4$:

$\{1y\}$ iff $1/4 - F > (1-c)^2/4$, or $F < c(2-c)/4$, which is not true. So $\{1n, 2n\}$ results.

Hence the result. \square

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